

Excel

Get the Results You Want!

SmartStudy 7

Mathematics

Free-to-download sample pages with answers

Allyn Jones



PASCAL
PRESS

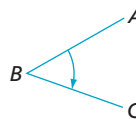
ANGLES AND LINES

Geometric Reasoning



STUDY NOTES

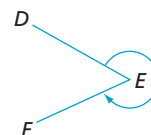
- 1 An **angle** is made up of two arms (**rays**) meeting at a **vertex**.
For example, the angle shown is named ABC , or CBA , or B .



- 2 Angles ($\angle$ s) can be classified according to their size:

- **acute angle:** less than 90°
- **obtuse angle:** between 90° and 180°
- **reflex angle:** between 180° and 360°
- **right angle:** equal to 90°
- **straight angle:** equal to 180°
- **revolution:** equal to 360°

For example, what type of angle is $\angle DEF$? It is between 180° and 360°
 $\therefore$ reflex angle



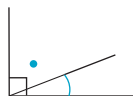
- 3 Special angles include:

adjacent



share a common arm and vertex

complementary



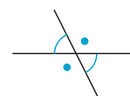
two or more angles adding to 90°

supplementary



two or more angles adding to 180°

vertically opposite



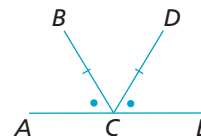
opposite angles are equal

For example: Find the supplement of 50° .

As supplementary angles add 180° , then the supplement of 50° is 130° ($50 + ? = 180$)

- 4 **Markings** are used to show equal size and length.

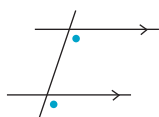
For example, in the diagram, $\angle ACB = \angle DCE$ and $BC = DC$



- 5 **Parallel** lines have the same direction. AB parallel to CD is written $AB \parallel CD$.

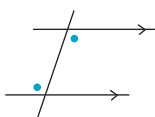
When a third line, called a **transversal**, cuts parallel lines, the angles formed have special relationships.

corresponding



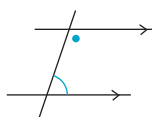
angles are equal

alternate

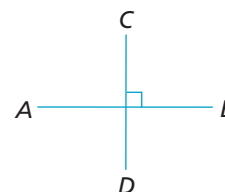


angles are equal

co-interior



angles are supplementary



- 6 **Perpendicular** lines meet at right angles.

AB perpendicular to CD is written $AB \perp CD$.

Checklist

Can you:

- 1 Name and classify angles?
- 2 Recognise adjacent, complementary, supplementary and vertically opposite angles?
- 3 Identify corresponding, alternate and co-interior angles?
- 4 Use symbols to represent equal angles, equal sides, parallel lines and perpendicular lines?



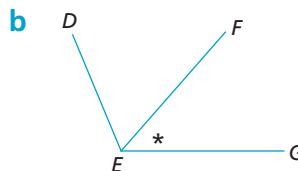
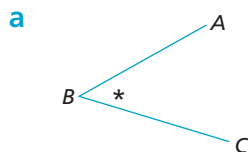


ANGLES AND LINES

Geometric Reasoning

SKILLS CHECK

- 1 Name the angles marked with an asterisk (*).



- 2 What type of angle is each of the following?

a 62°

b 355°

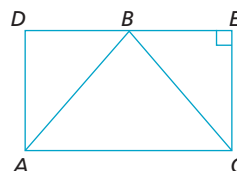
c 151°

- 3 From the diagram, where $ADEC$ is a rectangle, name:

a a right angle

b an acute angle

c a pair of adjacent angles.



- 4 Find the:

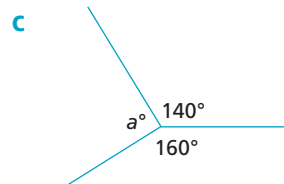
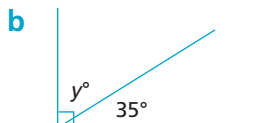
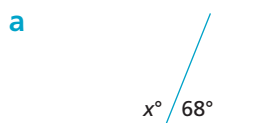
a complement of 72°

b supplement of 100°

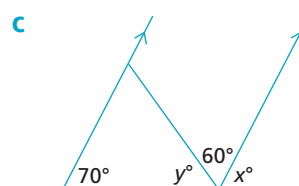
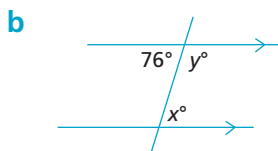
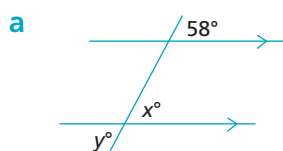
c complement of x°

d supplement of y°

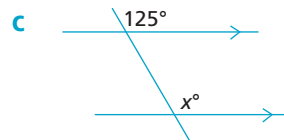
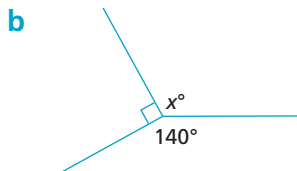
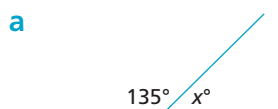
- 5 Find the value of each pronumeral.



- 6 Find the value of each pronumeral.



- 7 Find the value of x , giving reasons.



Answers a $\angle ABC$ b $\angle FEC$ 2a acute b reflex c obtuse 3a $\angle ADB$, others b $\angle DAB$, others c $\angle DAB$ and $\angle BAC$, others 4a 18° b 80° c $(90 - x)^\circ$ d $(180 - y)^\circ$ 5a $x = 112$ b $y = 55$ c $a = 60$ 6a $x = 58$, $y = 58$ b $x = 76$, $y = 104$ c $x = 70$, $y = 50$ 7a $x = 45$ (straight $\angle$) b $x = 130$ (revolution) c $x = 125$ (corresponding $\angle$ s, parallel lines)

ANGLES AND LINES

Geometric Reasoning

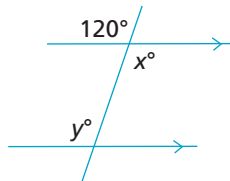


INTERMEDIATE TEST

Part A Multiple Choice

1 The values of x and y are:

- A** $x = 120, y = 60$ **B** $x = 120, y = 120$
C $x = 60, y = 120$ **D** $x = 60, y = 60$



(1 mark)

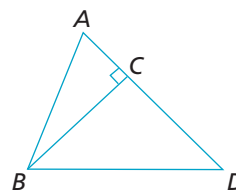
2 The complement of 75° is:

- A** 5° **B** 15°
C 105° **D** 125°

(1 mark)

3 Which of the following angles are supplementary?

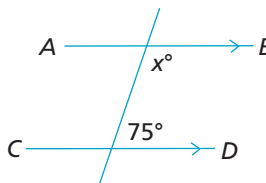
- A** $\angle ABC$ and $\angle CBD$ **B** $\angle BAC$ and $\angle BDC$
C $\angle ACB$ and $\angle DCB$ **D** $\angle CBA$ and $\angle CDB$



(1 mark)

4 Which of the following is true?

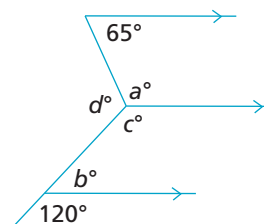
- A** $x = 75$ (corresponding $\angle$ s, $AB \parallel CD$)
B $x = 75$ (alternate $\angle$ s, $AB \parallel CD$)
C $x = 105$ (vertically opposite $\angle$ s)
D $x = 105$ (co-interior $\angle$ s, $AB \parallel CD$)



(1 mark)

5 Which of the following is **not** true?

- A** $a = 115$ **B** $b = 60$
C $c = 120$ **D** $d = 135$

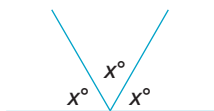


(1 mark)

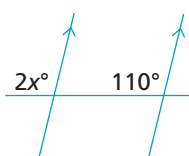
Part B Short Answer

6 Find the value of each pronumeral: *Hint 1*

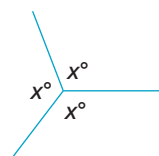
a



b



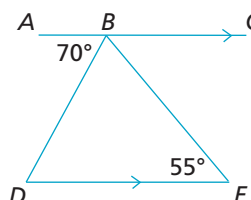
c



(2 marks each)

7 Complete with reason: *Hint 2*

- $\angle BDE = \underline{\hspace{2cm}}$ ()
 $\angle CBE = \underline{\hspace{2cm}}$ ()
 $\angle DBE = \underline{\hspace{2cm}}$ ()



(6 marks)

Your Feedback

$\times 100\% = \underline{\hspace{2cm}}\%$



PAGE 135



PAGE 161

Hint 1: Form a simple equation to solve.

Hint 2: Keep your reason concise.

ANGLES AND LINES

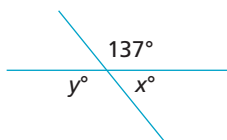
Geometric Reasoning



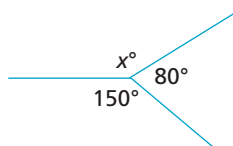
ADVANCED TEST

1 Find the value of the pronumerals:

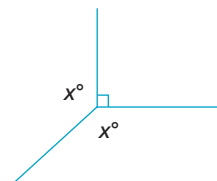
a



b



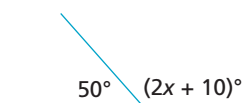
c



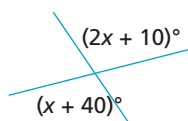
(1 mark each)

2 Find the value of x :

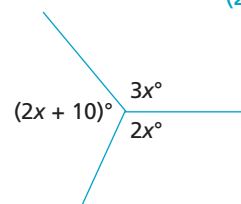
a



b



c



(2 marks each)

3 Find the complement of y°

(1 mark)

4 Find the supplement of p°

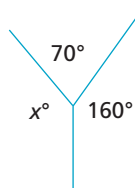
(1 mark)

5 Find the pronumeral:

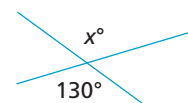
a



b



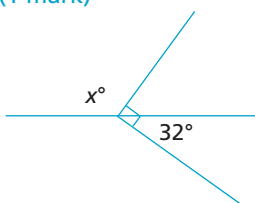
c



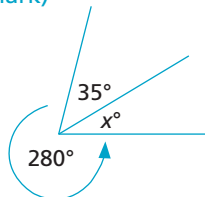
(1 mark each)

6 Write the value of the pronumerals:

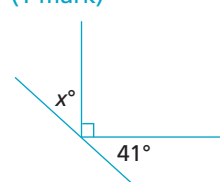
a (1 mark)



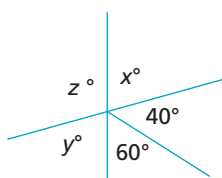
b (1 mark)



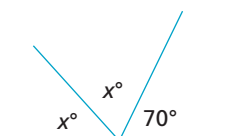
c (1 mark)



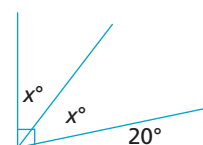
d (3 marks)



e (1 mark)



f (1 mark)



ANGLES AND LINES

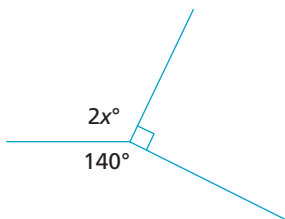
Geometric Reasoning



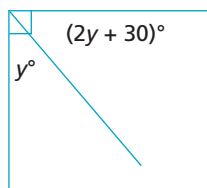
ADVANCED TEST continued

- 7 Find the value of the pronumerals:

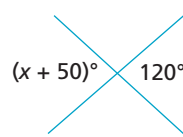
a



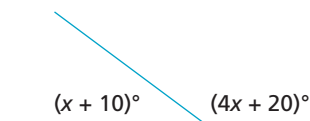
b



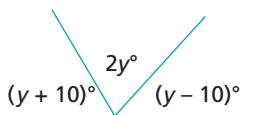
c



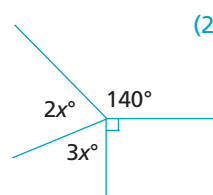
d



e



f



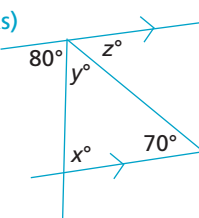
- 8 Two complementary angles are $(2x + 20)^\circ$ and $(x + 10)^\circ$. Find the value of x . (2 marks)

- 9 The vertically opposite angles are $(4x + 20)^\circ$ and $(2x + 60)^\circ$. Find the value of x . (2 marks)

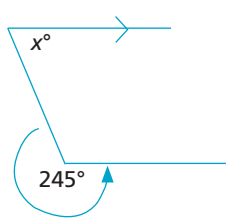
- 10 Supplementary angles are $2x^\circ$, $(x + 40)^\circ$ and 20° . Find the value of x . (2 marks)

- 11 Find the value of the pronumerals:

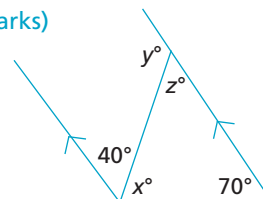
a (3 marks)



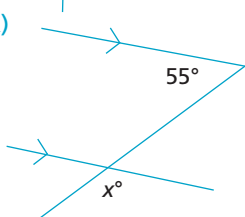
b (1 mark)



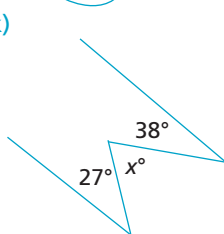
c (3 marks)



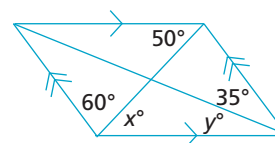
d (1 mark)



e (1 mark)

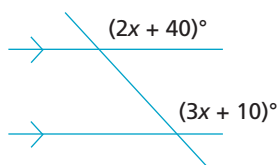


f (2 marks)

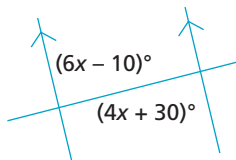


- 12 Find the value of the pronumerals:

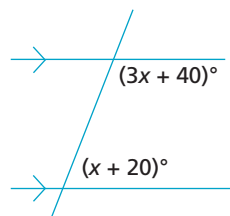
a



b



c



Your Feedback

$$\frac{\boxed{}}{57} \times 100\% = \boxed{}\%$$



PAGE 135



PAGE 161

TRIANGLES AND QUADRILATERALS

Geometric Reasoning

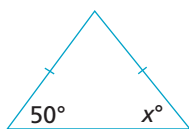


STUDY NOTES

- 1 A **triangle** (Δ) has an angle ($\angle$) sum of 180° , and can be categorised according to:
- Sides: **equilateral**—3 sides equal; **isosceles**—2 sides equal; **scalene**—0 sides equal
 - Angles: **acute-angled**—all angles less than 90° ; **right-angled**— 90° ; **obtuse-angled**—between 90° and 180° .

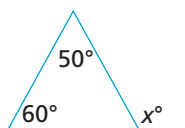
For example, find the value of x , giving reasons:

a



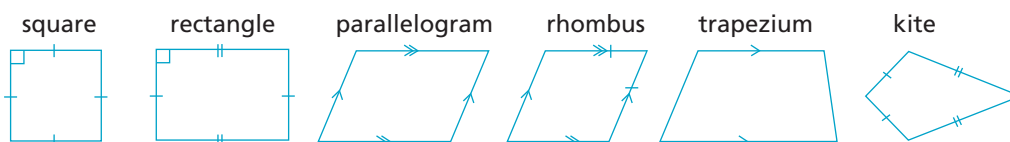
$$x = 50 \quad [\text{base } \angle\text{s of isos. } \Delta \text{ equal}]$$

b



$$x = 110 \quad [\text{ext. } \angle \text{ of } \Delta \text{ equal to sum of 2 int. opp. } \angle\text{s}]$$

- 2 A **quadrilateral** has four sides, and includes:



- 3 A **convex quadrilateral** is a four-sided polygon with diagonals inside the figure.

- 4 The **angle sum** of a quadrilateral is 360° . For example, find the value of the pronumerals:

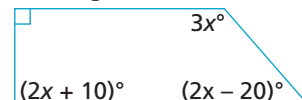
a $x = 360 - 260$

$$= 100$$

b $7x + 80 = 360$

$$\frac{7x}{7} = \frac{280}{7}$$

$$x = 40$$



Special quadrilateral properties	Parallelogram	Rhombus	Rectangle	Square	Trapezium	Kite
Opposite sides equal	✓	✓	✓	✓		
Opposite sides parallel	✓	✓	✓	✓	one pair	
Adjacent sides equal		✓		✓		some are
Adjacent sides perpendicular			✓	✓		
Opposite angles equal	✓	✓	✓	✓		one pair
Diagonals equal in length			✓	✓		
Diagonals bisect each other	✓	✓	✓	✓		one is bisected
Diagonals cross each other at 90°		✓		✓		✓
Diagonals bisect angles of quad.		✓		✓		two bisected

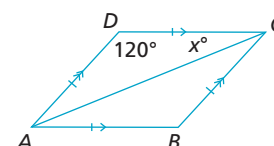
For example, find the value of the pronumerals:

a $\frac{3x}{3} = \frac{75}{3}$

$$x = 25$$

b $\angle BCD = 60^\circ$

$$x = 30$$



Checklist

Can you:

- Find the value of unknown pronumerals in triangles and quadrilaterals?
- Give adequate reasons when finding the size of angles in triangles and quadrilaterals?


☐
☐

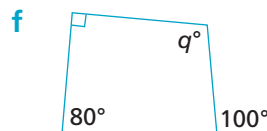
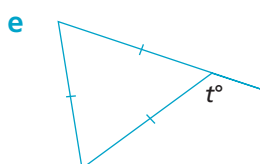
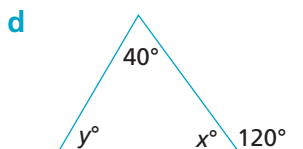
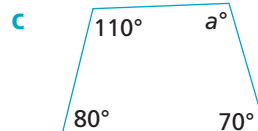
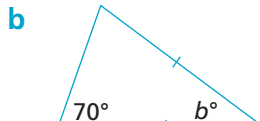
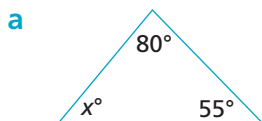
TRIANGLES AND QUADRILATERALS

Geometric Reasoning

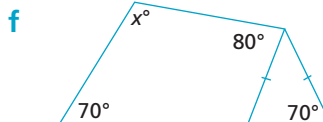
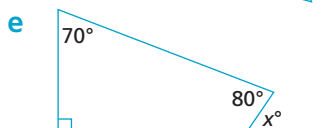
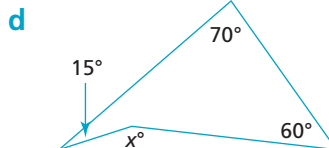
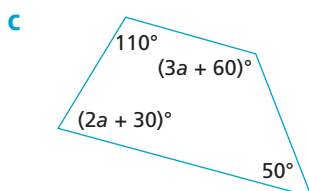
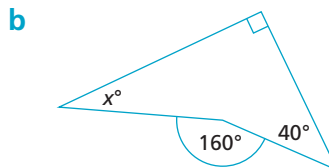
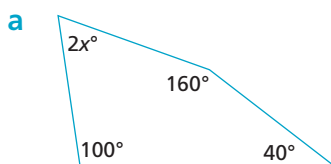


SKILLS CHECK

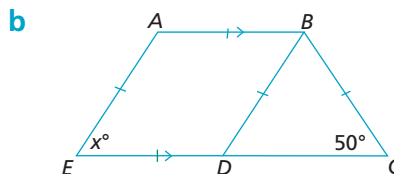
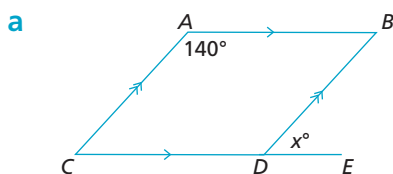
1 Find the value of each pronumeral:



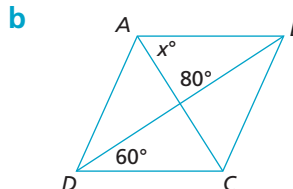
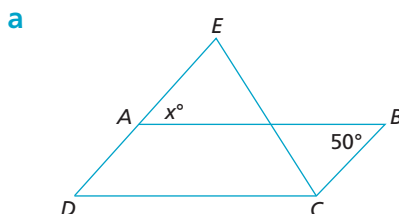
2 Find the value of the pronumerals:



3 Find the value of the pronumerals, giving reasons:



4 If ABCD is a parallelogram, find the value of x, giving reasons:



PAGE 137

Answers 1a $x = 45$ b $x = 40$ c $a = 100$ d $x = 60$, $y = 80$ e $t = 120$ f $q = 110$ 2a $x = 30$ b $x = 30$ c $a = 22$ d $x = 145$ e $x = 60$ f $x = 100$ 3a $x = 40$ (reasons: see worked solutions) b $x = 50$ (reasons: see worked solutions) 4a $x = 50$ (reasons: see worked solutions) b $x = 40$ (reasons: see worked solutions)

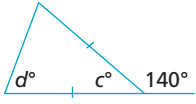
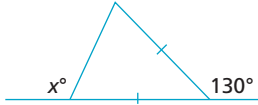
TRIANGLES AND QUADRILATERALS

Geometric Reasoning

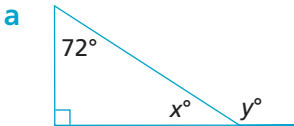
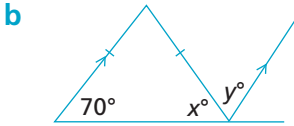
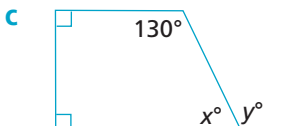
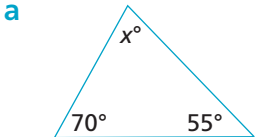
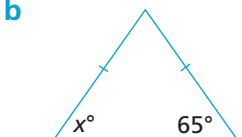
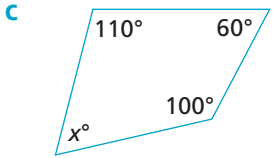
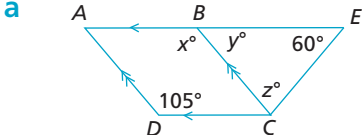
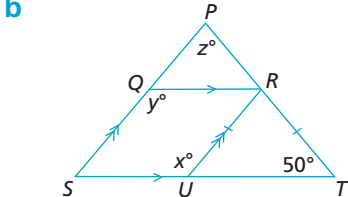


INTERMEDIATE TEST

Part A Multiple Choice

- The angle sum of a quadrilateral is:
A 90° **B** 180° **C** 360° **D** 400° (1 mark)
- The values of c and d are:
A $c = 40^\circ, d = 40^\circ$ **B** $c = 60^\circ, d = 70^\circ$
C $c = 60^\circ, d = 40^\circ$ **D** $c = 40^\circ, d = 70^\circ$

(1 mark)
- Helen knows that two angles in a triangle are 40° and 57° . She concludes that the triangle is:
A right-angled **B** obtuse-angled **C** isosceles **D** scalene (1 mark)
- The value of x is: *Hint 1*
A 50 **B** 115
C 105 **D** 110
 
(1 mark)
- Louise drew a quadrilateral with diagonals that bisect at right angles. Her quadrilateral could **not** be a:
A kite **B** square **C** rhombus **D** trapezium (1 mark)
- A quadrilateral has two pairs of equal sides and one axis of symmetry. It must be a:
A kite **B** parallelogram **C** rectangle **D** trapezium (1 mark)

Part B Short Answer

- Find the value of the pronumerals. (2 marks each)
 - 
 - 
 - 
- Find the value of the pronumerals, giving reasons. (2 marks each)
 - 
 - 
 - 
- Find the value of the pronumerals, giving reasons for your answer. (3 marks each)
 - 
 - 

Hint 1: First find the angles inside the isosceles triangle.

Your Feedback

$\div 24 \times 100\% =$

%



TRIANGLES AND QUADRILATERALS

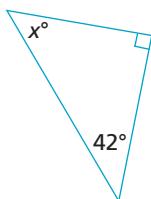
Geometric Reasoning



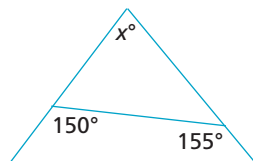
ADVANCED TEST

1 Find the value of the pronumerals:

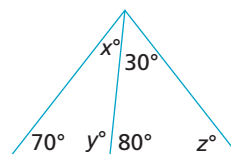
a (1 mark)



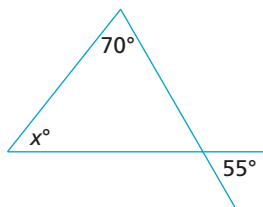
b (1 mark)



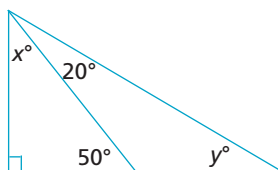
c (3 marks)



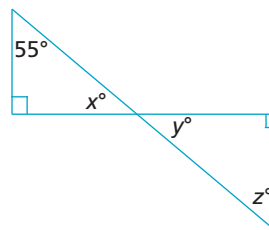
d (1 mark)



e (2 marks)

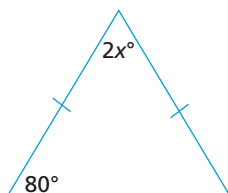


f (3 marks)

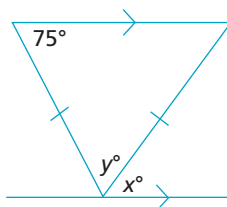


2 Write the value of the pronumerals:

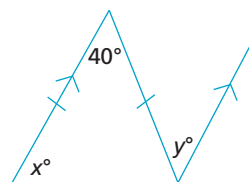
a (2 marks)



b (2 marks)

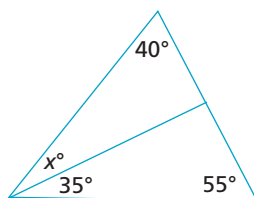


c (2 marks)

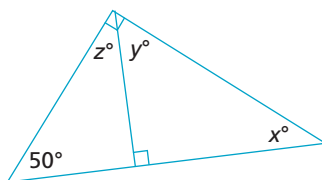


3 What is the value of each pronumeral?

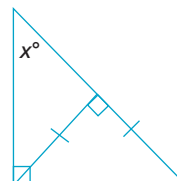
a (2 marks)



b (3 marks)



c (2 marks)



TRIANGLES AND QUADRILATERALS

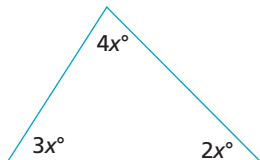
Geometric Reasoning



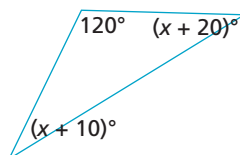
ADVANCED TEST continued

4 Find the value of the pronumerals:

a

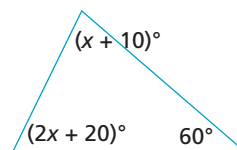


b



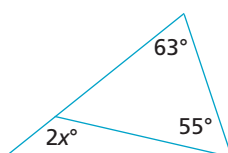
c

(2 marks each)

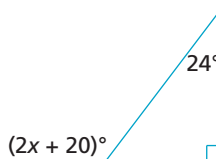


5 Find the pronumeral:

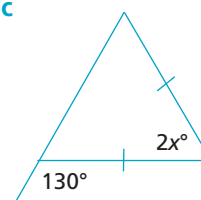
a



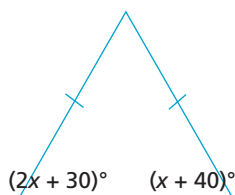
b



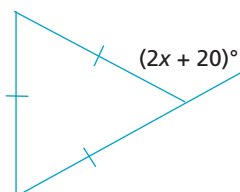
c



d

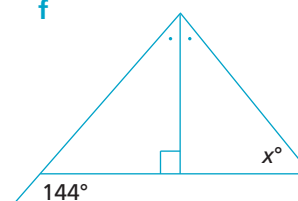


e



f

(2 marks each)

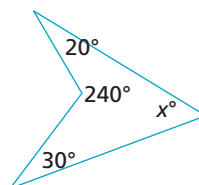


6 Write the value of the pronumeral:

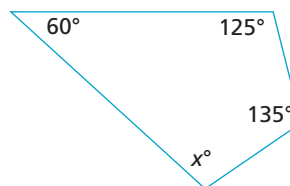
a (1 mark)



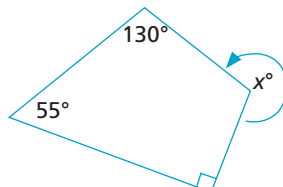
b (1 mark)



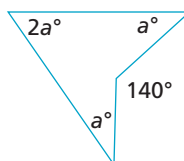
c (1 mark)



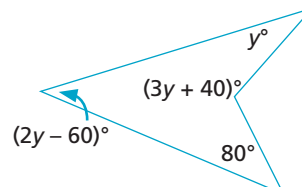
d (1 mark)



e (2 marks)



f (2 marks)



Your Feedback

$$\frac{\boxed{}}{50} \times 100\% = \boxed{}\%$$



PROBABILITY

Chance



STUDY NOTES

- 1 Probability is the study of **chance**.
- 2 The probability of an **event** is expressed as a fraction, decimal or percentage.
- 3 An event will have a number of **outcomes**.
For example, list the outcomes if a die is tossed. There are six outcomes: 1, 2, 3, 4, 5, 6.
- 4 A **simple event** is an event where each possible outcome is equally likely.
- 5 Probability ranges from **0** (impossible event) to **1** (certain event).
- 6 The **probability of an event** $Pr(E)$ is written as:

$$Pr(E) = \frac{\text{number of favourable outcomes}}{\text{number of possible outcomes}}$$

For example, a bag contains three red balls and two blue balls. If a ball is chosen at random, what is the probability that the ball is red?

$$Pr(\text{red}) = \frac{3}{5}$$

- 7 The **sum of all possible outcomes of an event is 1**.
For example, a coin is tossed. Write down the possibility of throwing a:

a head

$$\therefore Pr(\text{head}) = \frac{1}{2}$$

b tail

$$\therefore Pr(\text{tail}) = \frac{1}{2}$$

As these are the only two possible outcomes, the sum of the probabilities is $\frac{1}{2} + \frac{1}{2} = 1$.

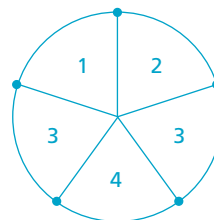
- 8 When we identify **complementary events**, we can quickly determine probabilities.
For example, a die is tossed. Find the probability of not tossing a 4.

$$\begin{aligned} Pr(\text{not tossing a 4}) &= 1 - Pr(\text{tossing a 4}) \\ &= 1 - \frac{1}{6} \\ &= \frac{5}{6} \end{aligned}$$

- 9 In some questions the outcomes are **not equally likely**.
For example, the spinner illustrated is used to choose a number.
What is the probability of spinning a 3?

Two of the sectors are labelled with the number 3,

$$\text{so } Pr(\text{spinning a 3}) = \frac{2}{5}$$



Checklist

Can you:

- 1 List all possible outcomes of a single event?
- 2 Recognise that the sum of probabilities is equal to 1?
- 3 Identify the complement of an event?
- 4 Find the probability of a complementary event?
- 5 Solve word problems involving probability?

☐
☐
☐
☐
☐
☐

PROBABILITY

Chance



SKILLS CHECK

- A bag contains nine identical balls, numbered 1 to 9. A ball is selected at random from the bag. Find the probability that the number on the selected ball is:

a 3	b even	c odd
d not odd	e composite	f prime
g divisible by 3	h a factor of 15	i less than 7
j more than 4	k 3 or 5	l even or odd?
- A die is rolled. Find the probability that the number is:

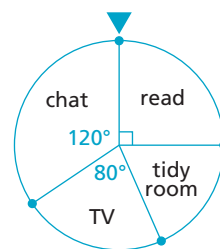
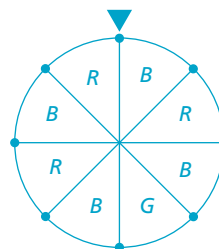
a a six	b less than 4	c not three
d not an odd number	e a square number	f a seven.
- A bag contains 4 red marbles, 3 white marbles, 2 green marbles and a blue marble. A marble is chosen at random. What is the probability that the marble is:

a red?	b white?	c white or green?
d not blue?	e black?	f red, white or blue?
- A jar contains jelly beans. The ratio of red jelly beans to white jelly beans is 4:3. If a jelly bean is selected at random, what is the probability of choosing a red jelly bean?
- The circle illustrated represents a spinner where identical sectors are coloured using blue (*B*), red (*R*) or green (*G*) paint. What is the probability of spinning:

a red?
b green?
c not blue?
- A jar contains 6 red, 4 black and 2 green jelly babies. A jelly baby is selected at random and eaten. What is the probability that the jar now contains 5 red jelly babies?
- At a certain hospital the probability of a female birth last year was 0.53.

a What was the probability of a male birth?
b If there were 1200 births last year, how many were likely to be female?
- Kalie uses the spinner illustrated to determine what she does tonight. What is the probability that she will:

a watch TV?
b not tidy her room?



Answers

1a $\frac{1}{9}$ b $\frac{1}{4}$ c $\frac{6}{9}$ d $\frac{5}{9}$ e $\frac{4}{9}$ f $\frac{4}{9}$ g $\frac{1}{3}$ h $\frac{2}{9}$ i $\frac{5}{9}$ j $\frac{4}{9}$ k $\frac{2}{9}$ l $\frac{5}{9}$

2a $\frac{1}{6}$ b $\frac{2}{6}$ c $\frac{5}{6}$ d $\frac{2}{6}$ e $\frac{1}{6}$ f $\frac{1}{6}$

3a $\frac{4}{9}$ b $\frac{3}{9}$ c $\frac{5}{9}$ d $\frac{1}{9}$ e $\frac{2}{9}$ f $\frac{5}{9}$

4a $\frac{4}{7}$ b $\frac{3}{7}$ c $\frac{5}{7}$ d $\frac{4}{7}$ e $\frac{3}{7}$ f $\frac{5}{7}$

5a $\frac{2}{8}$ b $\frac{2}{8}$ c $\frac{4}{8}$ d $\frac{6}{8}$ e $\frac{1}{8}$ f $\frac{7}{8}$ g $\frac{2}{8}$ h $\frac{1}{8}$ i $\frac{3}{8}$ j $\frac{2}{8}$ k $\frac{1}{8}$ l $\frac{7}{8}$ m $\frac{2}{8}$ n $\frac{1}{8}$ o $\frac{3}{8}$ p $\frac{2}{8}$ q $\frac{1}{8}$ r $\frac{7}{8}$ s $\frac{2}{8}$ t $\frac{1}{8}$ u $\frac{7}{8}$ v $\frac{2}{8}$ w $\frac{1}{8}$ x $\frac{7}{8}$ y $\frac{2}{8}$ z $\frac{1}{8}$

6a $\frac{6}{12}$ b $\frac{4}{12}$ c $\frac{2}{12}$ d $\frac{6}{11}$ e $\frac{4}{11}$ f $\frac{2}{11}$ g $\frac{6}{10}$ h $\frac{4}{10}$ i $\frac{2}{10}$ j $\frac{6}{9}$ k $\frac{4}{9}$ l $\frac{2}{9}$ m $\frac{6}{8}$ n $\frac{4}{8}$ o $\frac{2}{8}$ p $\frac{6}{7}$ q $\frac{4}{7}$ r $\frac{2}{7}$ s $\frac{6}{6}$ t $\frac{4}{6}$ u $\frac{2}{6}$ v $\frac{6}{5}$ w $\frac{4}{5}$ x $\frac{2}{5}$ y $\frac{6}{4}$ z $\frac{4}{4}$ aa $\frac{2}{4}$ ab $\frac{6}{3}$ ac $\frac{4}{3}$ ad $\frac{2}{3}$ ae $\frac{6}{2}$ af $\frac{4}{2}$ ag $\frac{2}{2}$ ah $\frac{6}{1}$ ai $\frac{4}{1}$ aj $\frac{2}{1}$ ak $\frac{6}{0}$ al $\frac{4}{0}$ am $\frac{2}{0}$ an $\frac{6}{-1}$ ao $\frac{4}{-1}$ ap $\frac{2}{-1}$ aq $\frac{6}{-2}$ ar $\frac{4}{-2}$ as $\frac{2}{-2}$ at $\frac{6}{-3}$ au $\frac{4}{-3}$ av $\frac{2}{-3}$ aw $\frac{6}{-4}$ ax $\frac{4}{-4}$ ay $\frac{2}{-4}$ az $\frac{6}{-5}$ ba $\frac{4}{-5}$ bb $\frac{2}{-5}$ bc $\frac{6}{-6}$ bd $\frac{4}{-6}$ be $\frac{2}{-6}$ bf $\frac{6}{-7}$ bg $\frac{4}{-7}$ bh $\frac{2}{-7}$ bi $\frac{6}{-8}$ bj $\frac{4}{-8}$ bk $\frac{2}{-8}$ bl $\frac{6}{-9}$ bm $\frac{4}{-9}$ bn $\frac{2}{-9}$ bo $\frac{6}{-10}$ bp $\frac{4}{-10}$ bq $\frac{2}{-10}$ br $\frac{6}{-11}$ bs $\frac{4}{-11}$ bt $\frac{2}{-11}$ bu $\frac{6}{-12}$ bv $\frac{4}{-12}$ bw $\frac{2}{-12}$ bx $\frac{6}{-13}$ by $\frac{4}{-13}$ bz $\frac{2}{-13}$ ca $\frac{6}{-14}$ cb $\frac{4}{-14}$ cc $\frac{2}{-14}$ cd $\frac{6}{-15}$ ce $\frac{4}{-15}$ cf $\frac{2}{-15}$ cg $\frac{6}{-16}$ ch $\frac{4}{-16}$ ci $\frac{2}{-16}$ cj $\frac{6}{-17}$ ck $\frac{4}{-17}$ cl $\frac{2}{-17}$ cm $\frac{6}{-18}$ cn $\frac{4}{-18}$ co $\frac{2}{-18}$ cp $\frac{6}{-19}$ cq $\frac{4}{-19}$ cr $\frac{2}{-19}$ cs $\frac{6}{-20}$ ct $\frac{4}{-20}$ cu $\frac{2}{-20}$ cv $\frac{6}{-21}$ cw $\frac{4}{-21}$ cx $\frac{2}{-21}$ cy $\frac{6}{-22}$ cz $\frac{4}{-22}$ da $\frac{2}{-23}$ db $\frac{6}{-24}$ dc $\frac{4}{-25}$ dd $\frac{2}{-26}$ de $\frac{6}{-27}$ df $\frac{4}{-28}$ dg $\frac{2}{-29}$ dh $\frac{6}{-30}$ di $\frac{4}{-31}$ dj $\frac{2}{-32}$ dk $\frac{6}{-33}$ dl $\frac{4}{-34}$ dm $\frac{2}{-35}$ dn $\frac{6}{-36}$ do $\frac{4}{-37}$ dp $\frac{2}{-38}$ dq $\frac{6}{-39}$ dr $\frac{4}{-40}$ ds $\frac{2}{-41}$ dt $\frac{6}{-42}$ du $\frac{4}{-43}$ dv $\frac{2}{-44}$ dw $\frac{6}{-45}$ dx $\frac{4}{-46}$ dy $\frac{2}{-47}$ dz $\frac{6}{-48}$ ea $\frac{4}{-49}$ eb $\frac{2}{-50}$ ec $\frac{6}{-51}$ ed $\frac{4}{-52}$ ee $\frac{2}{-53}$ ef $\frac{6}{-54}$ eg $\frac{4}{-55}$ eh $\frac{2}{-56}$ ei $\frac{6}{-57}$ ej $\frac{4}{-58}$ ek $\frac{2}{-59}$ el $\frac{6}{-60}$ em $\frac{4}{-61}$ en $\frac{2}{-62}$ eo $\frac{6}{-63}$ ep $\frac{4}{-64}$ eq $\frac{2}{-65}$ er $\frac{6}{-66}$ es $\frac{4}{-67}$ et $\frac{2}{-68}$ eu $\frac{6}{-69}$ ev $\frac{4}{-70}$ ew $\frac{2}{-71}$ ex $\frac{6}{-72}$ ey $\frac{4}{-73}$ ez $\frac{2}{-74}$ fa $\frac{6}{-75}$ fb $\frac{4}{-76}$ fc $\frac{2}{-77}$ fd $\frac{6}{-78}$ fe $\frac{4}{-79}$ ff $\frac{2}{-80}$ fg $\frac{6}{-81}$ fh $\frac{4}{-82}$ fi $\frac{2}{-83}$ fj $\frac{6}{-84}$ fk $\frac{4}{-85}$ fl $\frac{2}{-86}$ fm $\frac{6}{-87}$ fn $\frac{4}{-88}$ fo $\frac{2}{-89}$ fp $\frac{6}{-90}$ fq $\frac{4}{-91}$ fr $\frac{2}{-92}$ fs $\frac{6}{-93}$ ft $\frac{4}{-94}$ fu $\frac{2}{-95}$ fv $\frac{6}{-96}$ fw $\frac{4}{-97}$ fx $\frac{2}{-98}$ fy $\frac{6}{-99}$ fz $\frac{4}{-100}$ ga $\frac{2}{-101}$ gb $\frac{6}{-102}$ gc $\frac{4}{-103}$ gd $\frac{2}{-104}$ ge $\frac{6}{-105}$ gf $\frac{4}{-106}$ gg $\frac{2}{-107}$ gh $\frac{6}{-108}$ gi $\frac{4}{-109}$ gj $\frac{2}{-110}$ gk $\frac{6}{-111}$ gl $\frac{4}{-112}$ gm $\frac{2}{-113}$ gn $\frac{6}{-114}$ go $\frac{4}{-115}$ gp $\frac{2}{-116}$ gq $\frac{6}{-117}$ gr $\frac{4}{-118}$ gs $\frac{2}{-119}$ gt $\frac{6}{-120}$ gu $\frac{4}{-121}$ gv $\frac{2}{-122}$ gw $\frac{6}{-123}$ gx $\frac{4}{-124}$ gy $\frac{2}{-125}$ gz $\frac{6}{-126}$ ha $\frac{4}{-127}$ hb $\frac{2}{-128}$ hc $\frac{6}{-129}$ hd $\frac{4}{-130}$ he $\frac{2}{-131}$ hf $\frac{6}{-132}$ hg $\frac{4}{-133}$ hh $\frac{2}{-134}$ hi $\frac{6}{-135}$ hj $\frac{4}{-136}$ hk $\frac{2}{-137}$ hl $\frac{6}{-138}$ hm $\frac{4}{-139}$ hn $\frac{2}{-140}$ ho $\frac{6}{-141}$ hp $\frac{4}{-142}$ hq $\frac{2}{-143}$ hr $\frac{6}{-144}$ hs $\frac{4}{-145}$ ht $\frac{2}{-146}$ hu $\frac{6}{-147}$ hv $\frac{4}{-148}$ hw $\frac{2}{-149}$ hx $\frac{6}{-150}$ hy $\frac{4}{-151}$ hz $\frac{2}{-152}$ ia $\frac{6}{-153}$ ib $\frac{4}{-154}$ ic $\frac{2}{-155}$ id $\frac{6}{-156}$ ie $\frac{4}{-157}$ if $\frac{2}{-158}$ ig $\frac{6}{-159}$ ih $\frac{4}{-160}$ ii $\frac{2}{-161}$ ij $\frac{6}{-162}$ ik $\frac{4}{-163}$ il $\frac{2}{-164}$ im $\frac{6}{-165}$ in $\frac{4}{-166}$ io $\frac{2}{-167}$ ip $\frac{6}{-168}$ iq $\frac{4}{-169}$ ir $\frac{2}{-170}$ is $\frac{6}{-171}$ it $\frac{4}{-172}$ iu $\frac{2}{-173}$ iv $\frac{6}{-174}$ iw $\frac{4}{-175}$ ix $\frac{2}{-176}$ iy $\frac{6}{-177}$ iz $\frac{4}{-178}$ ja $\frac{2}{-179}$ jb $\frac{6}{-180}$ jc $\frac{4}{-181}$ jd $\frac{2}{-182}$ je $\frac{6}{-183}$ jf $\frac{4}{-184}$ jg $\frac{2}{-185}$ jh $\frac{6}{-186}$ ji $\frac{4}{-187}$ jj $\frac{2}{-188}$ jk $\frac{6}{-189}$ jl $\frac{4}{-190}$ jm $\frac{2}{-191}$ jn $\frac{6}{-192}$ jo $\frac{4}{-193}$ jp $\frac{2}{-194}$ jq $\frac{6}{-195}$ jr $\frac{4}{-196}$ js $\frac{2}{-197}$ jt $\frac{6}{-198}$ ju $\frac{4}{-199}$ jv $\frac{2}{-200}$ jw $\frac{6}{-201}$ jx $\frac{4}{-202}$ jy $\frac{2}{-203}$ jz $\frac{6}{-204}$ ka $\frac{4}{-205}$ kb $\frac{2}{-206}$ kc $\frac{6}{-207}$ kd $\frac{4}{-208}$ ke $\frac{2}{-209}$ kf $\frac{6}{-210}$ kg $\frac{4}{-211}$ kh $\frac{2}{-212}$ ki $\frac{6}{-213}$ kj $\frac{4}{-214}$ kl $\frac{2}{-215}$ km $\frac{6}{-216}$ kn $\frac{4}{-217}$ ko $\frac{2}{-218}$ kp $\frac{6}{-219}$ kq $\frac{4}{-220}$ kr $\frac{2}{-221}$ ks $\frac{6}{-222}$ kt $\frac{4}{-223}$ ku $\frac{2}{-224}$ kv $\frac{6}{-225}$ kw $\frac{4}{-226}$ kx $\frac{2}{-227}$ ky $\frac{6}{-228}$ kz $\frac{4}{-229}$ la $\frac{2}{-230}$ lb $\frac{6}{-231}$ lc $\frac{4}{-232}$ ld $\frac{2}{-233}$ le $\frac{6}{-234}$ lf $\frac{4}{-235}$ lg $\frac{2}{-236}$ lh $\frac{6}{-237}$ li $\frac{4}{-238}$ lj $\frac{2}{-239}$ lk $\frac{6}{-240}$ ll $\frac{4}{-241}$ lm $\frac{2}{-242}$ ln $\frac{6}{-243}$ lo $\frac{4}{-244}$ lp $\frac{2}{-245}$ lq $\frac{6}{-246}$ lr $\frac{4}{-247}$ ls $\frac{2}{-248}$ lt $\frac{6}{-249}$ lu $\frac{4}{-250}$ lv $\frac{2}{-251}$ lw $\frac{6}{-252}$ lx $\frac{4}{-253}$ ly $\frac{2}{-254}$ lz $\frac{6}{-255}$ ma $\frac{4}{-256}$ mb $\frac{2}{-257}$ mc $\frac{6}{-258}$ md $\frac{4}{-259}$ me $\frac{2}{-260}$ mf $\frac{6}{-261}$ mg $\frac{4}{-262}$ mh $\frac{2}{-263}$ mi $\frac{6}{-264}$ mj $\frac{4}{-265}$ mk $\frac{2}{-266}$ ml $\frac{6}{-267}$ mn $\frac{4}{-268}$ mo $\frac{2}{-269}$ mp $\frac{6}{-270}$ mq $\frac{4}{-271}$ mr $\frac{2}{-272}$ ms $\frac{6}{-273}$ mt $\frac{4}{-274}$ mu $\frac{2}{-275}$ mv $\frac{6}{-276}$ mw $\frac{4}{-277}$ mx $\frac{2}{-278}$ my $\frac{6}{-279}$ mz $\frac{4}{-280}$ na $\frac{2}{-281}$ nb $\frac{6}{-282}$ nc $\frac{4}{-283}$ nd $\frac{2}{-284}$ ne $\frac{6}{-285}$ nf $\frac{4}{-286}$ ng $\frac{2}{-287}$ nh $\frac{6}{-288}$ ni $\frac{4}{-289}$ nj $\frac{2}{-290}$ nk $\frac{6}{-291}$ nl $\frac{4}{-292}$ nm $\frac{2}{-293}$ no $\frac{6}{-294}$ np $\frac{4}{-295}$ nq $\frac{2}{-296}$ nr $\frac{6}{-297}$ ns $\frac{4}{-298}$ nt $\frac{2}{-299}$ nu $\frac{6}{-300}$ nv $\frac{4}{-301}$ nw $\frac{2}{-302}$ nx $\frac{6}{-303}$ ny $\frac{4}{-304}$ nz $\frac{2}{-305}$ oa $\frac{6}{-306}$ ob $\frac{4}{-307}$ oc $\frac{2}{-308}$ od $\frac{6}{-309}$ oe $\frac{4}{-310}$ of $\frac{2}{-311}$ og $\frac{6}{-312}$ oh $\frac{4}{-313}$ oi $\frac{2}{-314}$ oj $\frac{6}{-315}$ ok $\frac{4}{-316}$ ol $\frac{2}{-317}$ om $\frac{6}{-318}$ on $\frac{4}{-319}$ oo $\frac{2}{-320}$ op $\frac{6}{-321}$ oq $\frac{4}{-322}$ or $\frac{2}{-323}$ os $\frac{6}{-324}$ ot $\frac{4}{-325}$ ou $\frac{2}{-326}$ ov $\frac{6}{-327}$ ow $\frac{4}{-328}$ ox $\frac{2}{-329}$ oy $\frac{6}{-330}$ oz $\frac{4}{-331}$ pa $\frac{2}{-332}$ pb $\frac{6}{-333}$ pc $\frac{4}{-334}$ pd $\frac{2}{-335}$ pe $\frac{6}{-336}$ pf $\frac{4}{-337}$ pg $\frac{2}{-338}$ ph $\frac{6}{-339}$ pi $\frac{4}{-340}$ pj $\frac{2}{-341}$ pk $\frac{6}{-342}$ pl $\frac{4}{-343}$ pm $\frac{2}{-344}$ pn $\frac{6}{-345}$ po $\frac{4}{-346}$ pp $\frac{2}{-347}$ pq $\frac{6}{-348}$ pr $\frac{4}{-349}$ ps $\frac{2}{-350}$ pt $\frac{6}{-351}$ pu $\frac{4}{-352}$ pv $\frac{2}{-353}$ pw $\frac{6}{-354}$ px $\frac{4}{-355}$ py $\frac{2}{-356}$ pz $\frac{6}{-357}$ qa $\frac{4}{-358}$ qb $\frac{2}{-359}$ qc $\frac{6}{-360}$ qd $\frac{4}{-361}$ qe $\frac{2}{-362}$ qf $\frac{6}{-363}$ qg $\frac{4}{-364}$ qh $\frac{2}{-365}$ qi $\frac{6}{-366}$ qj $\frac{4}{-367}$ qk $\frac{2}{-368}$ ql $\frac{6}{-369}$ qm $\frac{4}{-370}$ qn $\frac{2}{-371}$ qo $\frac{6}{-372}$ qp $\frac{4}{-373}$ qr $\frac{2}{-374}$ qs $\frac{6}{-375}$ qt $\frac{4}{-376}$ qu $\frac{2}{-377}$ qv $\frac{6}{-378}$ qw $\frac{4}{-379}$ qx $\frac{2}{-380}$ qy $\frac{6}{-381}$ qz $\frac{4}{-382}$ ra $\frac{2}{-383}$ rb $\frac{6}{-384}$ rc $\frac{4}{-385}$ rd $\frac{2}{-386}$ re $\frac{6}{-387}$ rf $\frac{4}{-388}$ rg $\frac{2}{-389}$ rh $\frac{6}{-390}$ ri $\frac{4}{-391}$ rj $\frac{2}{-392}$ rk $\frac{6}{-393}$ rl $\frac{4}{-394}$ rm $\frac{2}{-395}$ rn $\frac{6}{-396}$ ro $\frac{4}{-397}$ rp $\frac{2}{-398}$ rq $\frac{6}{-399}$ rr $\frac{4}{-400}$ rs $\frac{2}{-401}$ rt $\frac{6}{-402}$ ru $\frac{4}{-403}$ rv $\frac{2}{-404}$ rw $\frac{6}{-405}$ rx $\frac{4}{-406}$ ry $\frac{2}{-407}$ rz $\frac{6}{-408}$ sa $\frac{4}{-409}$ sb $\frac{2}{-410}$ sc $\frac{6}{-411}$ sd $\frac{4}{-412}$ se $\frac{2}{-413}$ sf $\frac{6}{-414}$ sg $\frac{4}{-415}$ sh $\frac{2}{-416}$ si $\frac{6}{-417}$ sj $\frac{4}{-418}$ sk $\frac{2}{-419}$ sl $\frac{6}{-420}$ sm $\frac{4}{-421}$ sn $\frac{2}{-422}$ so $\frac{6}{-423}$ sp $\frac{4}{-424}$ sq $\frac{2}{-425}$ sr $\frac{6}{-426}$ ss $\frac{4}{-427}$ st $\frac{2}{-428}$ su $\frac{6}{-429}$ sv $\frac{4}{-430}$ sw $\frac{2}{-431}$ sx $\frac{6}{-432}$ sy $\frac{4}{-433}$ sz $\frac{2}{-434}$ ta $\frac{6}{-435}$ tb $\frac{4}{-436}$ tc $\frac{2}{-437}$ td $\frac{6}{-438}$ te $\frac{4}{-439}$ tf $\frac{2}{-440}$ tg $\frac{6}{-441}$ th $\frac{4}{-442}$ ti $\frac{2}{-443}$ tj $\frac{6}{-444}$ tk $\frac{4}{-445}$ tl $\frac{2}{-446}$ tm $\frac{6}{-447}$ tn $\frac{4}{-448}$ to $\frac{2}{-449}$ tp $\frac{6}{-450}$ tq $\frac{4}{-451}$ tr $\frac{2}{-452}$ ts $\frac{6}{-453}$ tt $\frac{4}{-454}$ tu $\frac{2}{-455}$ tv $\frac{6}{-456}$ tw $\frac{4}{-457}$ tx $\frac{2}{-458}$ ty $\frac{6}{-459}$ tz $\frac{4}{-460}$ ua $\frac{2}{-461}$ ub $\frac{6}{-462}$ uc $\frac{4}{-463}$ ud $\frac{2}{-464}$ ue $\frac{6}{-465}$ uf $\frac{4}{-466}$ ug $\frac{2}{-467}$ uh $\frac{6}{-468}$ ui $\frac{4}{-469}$ uj $\frac{2}{-470}$ uk $\frac{6}{-471}$ ul $\frac{4}{-472}$ um $\frac{2}{-473}$ un $\frac{6}{-474}$ uo $\frac{4}{-475}$ up $\frac{2}{-476}$ uq $\frac{6}{-477}$ ur $\frac{4}{-478}$ us $\frac{2}{-479}$ ut $\frac{6}{-480}$ uu $\frac{4}{-481}$ uv $\frac{2}{-482}$ uw $\frac{6}{-483}$ ux $\frac{4}{-484}$ uy $\frac{2}{-485}$ uz $\frac{6}{-486}$ va $\frac{4}{-487}$ vb $\frac{2}{-488}$ vc $\frac{6}{-489}$ vd $\frac{4}{-490}$ ve $\frac{2}{-491}$ vf $\frac{6}{-492}$ vg $\frac{4}{-493}$ vh $\frac{2}{-494}$ vi $\frac{6}{-495}$ vj $\frac{4}{-496}$ vk $\frac{2}{-497}$ vl $\frac{6}{-498}$ vm $\frac{4}{-499}$ vn $\frac{2}{-500}$ vo $\frac{6}{-501}$ vp $\frac{4}{-502}$ vq $\frac{2}{-503}$ vr $\frac{6}{-504}$ vs $\frac{4}{-505}$ vt $\frac{2}{-506}$ vu $\frac{6}{-507}$ vv $\frac{4}{-508}$ vw $\frac{2}{-509}$ vx $\frac{6}{-510}$ vy $\frac{4}{-511}$ vz $\frac{2}{-512}$ wa $\frac{6}{-513}$ wb $\frac{4}{-514}$ wc $\frac{2}{-515}$ wd $\frac{6}{-516}$ we $\frac{4}{-517}$ wf $\frac{2}{-518}$ wg $\frac{6}{-519}$ wh $\frac{4}{-520}$ wi $\frac{2}{-521}$ wj $\frac{6}{-522}$ wk $\frac{4}{-523}$ wl $\frac{2}{-524}$ wm $\frac{6}{-525}$ wn $\frac{4}{-526}$ wo $\frac{2}{-527}$ wp $\frac{6}{-528}$ wq $\frac{4}{-529}$ wr $\frac{2}{-530}$ ws $\frac{6}{-531}$ wt $\frac{4}{-532}$ wu $\frac{2}{-533}$ wv $\frac{6}{-534}$ ww $\frac{4}{-535}$ wx $\frac{2}{-536}$ wy $\frac{6}{-537}$ wz $\frac{4}{-538}$ xa $\frac{2}{-539}$ xb $\frac{6}{-540}$ xc $\frac{4}{-541}$ xd $\frac{2}{-542}$ xe $\frac{6}{-543}$ xf $\frac{4}{-544}$ xg $\frac{2}{-545}$ xh $\frac{6}{-546}$ xi $\frac{4}{-547}$ xj $\frac{2}{-548}$ xk $\frac{6}{-549}$ xl $\frac{4}{-550}$ xm $\frac{2}{-551}$ xn $\frac{6}{-552}$ xo $\frac{4}{-553}$ xp $\frac{2}{-554}$ xq $\frac{6}{-555}$ xr $\frac{4}{-556}$ xs $\frac{2}{-557}$ xt $\frac{6}{-558}$ xu $\frac{4}{-559}$ xv $\frac{2}{-560}$ xv $\frac{6}{-561}$ xw $\frac{4}{-562}$ xy $\frac{2}{-563}$ xz $\frac{6}{-564}$ ya $\frac{4}{-565}$ yb $\frac{2}{-566}$ yc $\frac{6}{-567}$ yd $\frac{4}{-568}$ ye $\frac{2}{-569}$ yf $\frac{6}{-570}$ yg $\frac{4}{-571}$ yh $\frac{2}{-572}$ yi $\frac{6}{-573}$ yj $\frac{4}{-574}$ yk $\frac{2}{-575}$ yl $\frac{6}{-576}$ ym $\frac{4}{-577}$ yn $\frac{2}{-578}$ yo $\frac{6}{-579}$ yp $\frac{4}{-580}$ yq $\frac{2}{-581}$ yr $\frac{6}{-582}$ ys $\frac{4}{-583}$ yt $\frac{2}{-584}$ yu $\frac{6}{-585}$ yv $\frac{4}{-586}$ yw $\frac{2}{-587}$ yx $\frac{6}{-588}$ yz $\frac{4}{-589}$ za $\frac{2}{-590}$ zb $\frac{6}{-591}$ zc $\frac{4}{-592}$ zd $\frac{2}{-593}$ ze $\frac{6}{-594}$ zf $\frac{4}{-595}$ zg $\frac{2}{-596}$ zh $\frac{6}{-597}$ zi $\frac{4}{-598}$ zj $\frac{2}{-599}$ zk $\frac{6}{-600}$ zl $\frac{4}{-601}$ zm $\frac{2}{-602}$ zn $\frac{6}{-603}$ zo $\frac{4}{-604}$ zp $\frac{2}{-605}$ zq $\frac{6}{-606}$ zr $\frac{4}{-607}$ zs $\frac{2}{-608}$ zt $\frac{6}{-609}$ zu $\frac{4}{-610}$ zv $\frac{2}{-611}$ zw $\frac{6}{-612}$ zx $\frac{4}{-613}$ zy $\frac{2}{-614}$ zz $\frac{6}{-615}$

PROBABILITY

Chance



INTERMEDIATE TEST

Part A Multiple Choice

- 1 A bag contains 6 red cards and 4 blue cards. A card is chosen at random. What is the probability that the card is blue?
A $\frac{4}{5}$ **B** $\frac{2}{5}$ **C** $\frac{2}{3}$ **D** $\frac{3}{5}$ (1 mark)
- 2 A die is thrown. What is the probability of not throwing a three? *Hint 1*
A $\frac{1}{3}$ **B** $\frac{1}{6}$ **C** $\frac{1}{2}$ **D** $\frac{5}{6}$ (1 mark)
- 3 Each letter of the word PROBABILITY is written on identical cards and the eleven cards placed in a bag. If a card is drawn at random, what is the probability that the card is the letter B?
A $\frac{1}{2}$ **B** $\frac{1}{11}$ **C** $\frac{2}{11}$ **D** $\frac{6}{11}$ (1 mark)
- 4 A card is selected from a normal deck of playing cards (52 cards). What is the probability that the card is a red seven?
A $\frac{1}{26}$ **B** $\frac{1}{7}$ **C** $\frac{2}{7}$ **D** $\frac{2}{13}$ (1 mark)
- 5 In the game of 'lotto' there are 45 balls numbered 1 to 45. Peter predicts that the first number drawn will be higher than 40. The probability that Peter is correct is:
A $\frac{1}{9}$ **B** $\frac{4}{45}$ **C** $\frac{1}{5}$ **D** $\frac{1}{41}$ (1 mark)

Part B Short Answer

- 6 A bag contains 4 red balls, 2 green balls and 2 white balls. A ball is chosen at random. What is the probability that the ball is:
a red? **b** white? **c** not green? (1 mark each)
- 7 100 000 tickets are sold in a lottery. Sharon buys 10 tickets.
a Find the probability that Sharon wins first prize. (1 mark)
b Sharon does not win first prize. What is the probability she will win second prize? *Hint 2* (2 marks)
- 8 The six faces of a die are renumbered as 1, 1, 2, 2, 2, 3. If the die is rolled, what is the probability that the number rolled is a 2 or a 3? (2 marks)
- 9 A soccer club sold 100 raffle tickets. Mitchell bought ticket number 14.
a Find the probability that Mitchell wins first prize. (1 mark)
b What is the probability that the winning ticket will be one off Mitchell's ticket number? (1 mark)
- 10 A TV game show features a computer screen that rapidly flashes each of the nine squares illustrated, one at a time in random order. The contestant calls 'stop' and wins the amount displayed on the illustrated square. What is the probability the contestant wins:
a \$50? (1 mark) **b** no money? (1 mark)
c at least \$50 (1 mark)

\$50	\$0	\$20
\$80	\$10	\$0
\$40	\$0	\$75

Your Feedback

$\frac{\quad}{18} \times 100\% =$

%



PAGE 141



PAGE 161

Hint 1: Use complementary events.

Hint 2: There are still 99 999 tickets left in the draw.

PROBABILITY

Chance



ADVANCED TEST

- 1 From the word CHANCE a letter is chosen at random. What is the chance that the letter is:
- a an A? b a C?
 c a vowel? d a consonant?
 e not a consonant? (1 mark each)

- 2 Two dice are rolled and their **sum** is calculated. The results are to be listed in a table.
- a Complete the table: (2 marks)

	1	2	3	4	5	6
1	2	3	4	5		
2	3	4				
3	4					
4						
5						
6						

- b Which is the most likely sum? (1 mark)
 c What is the probability that the sum will be:
 i odd? ii less than 7?
 iii a square number? iv prime?
 v divisible by 3? vi a multiple of 4?
 vii a factor of 12? (1 mark each)

- 3 A bag contains numbered balls. The probability of selecting a 2 was $\frac{1}{2}$, a 3 was $\frac{1}{3}$. The remainder of the balls were numbered 1.

- a What is the smallest possible number of balls in the bag? (2 marks)
 b What is the probability of selecting:
 i a 1? (1 mark)
 ii less than 3? (1 mark)
 iii an odd number? (1 mark)

- 4 A die has been renumbered with the number 3 replaced with the number 2. If the die is rolled, what is the probability that it is:

- a a 2? (1 mark)
 b even? (1 mark)
 c less than 3? (1 mark)

- 5 A coloured ball is randomly chosen from a bag. The table shows the probabilities of the four colours.

	blue	green	red	yellow
probability	0.25	0.3		0.1

- a What was the probability of selecting a red ball? (1 mark)

- b If there were 40 balls in the bag, how many balls of each colour are there? (1 mark)
 c Explain why there cannot be 10 balls in the bag. (1 mark)
 d What is the smallest possible number of balls in the bag? (1 mark)

- 6 Two dice are rolled and their **product** is calculated. The results are to be listed in a table.

- a Complete the table: (2 marks)

	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

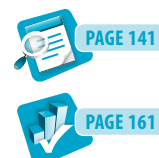
- b Which are the most likely products? (1 mark)
 c What is the probability that the product will be:
 i even? (1 mark)
 ii composite? (1 mark)
 iii a multiple of 4? (1 mark)
 iv a factor of 36? (1 mark)
 v prime and odd? (1 mark)
 vi prime or odd? (1 mark)

- 7 A bag contains balls which are of four different colours. It is twice as likely to choose an orange ball than it is to choose a pink ball. It is three times as likely to choose a pink ball than a green ball, and twice as likely to choose a red ball than a green ball.

- a Find the probability of choosing each colour. (2 marks)
 b What is the smallest possible number of balls in the bag? (1 mark)
 c If there are 72 balls in the bag, how many are red? (1 mark)
 d If the red balls were removed from the bag, what is the probability of choosing a green or an orange ball? (1 mark)

Your Feedback

$$\frac{\boxed{}}{41} \times 100\% = \boxed{}\%$$



DATA REPRESENTATION

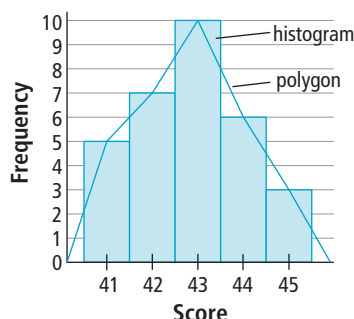
Data Representation and Interpretation



STUDY NOTES

- 1 Data can be represented in tabular form (e.g. **frequency distribution table**) or graphical form (e.g. **frequency histogram**, **frequency polygon**, **sector graph** or **column graph** etc.). For example, given the completed frequency distribution table, draw a frequency histogram and polygon for the following **discrete** data.

Score	Tally	Frequency
41	HHH	5
42	HHH II	7
43	HHH HHH	10
44	HHH I	6
45	III	3

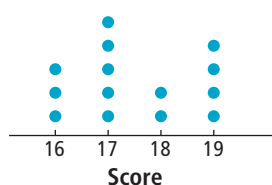


- 2 When data are **continuous**, they can be grouped in **class intervals** to make them easier to tabulate and graph. For example, complete a frequency table for the following data.

21 39 28 36 33 32 27 24 32 34 29
25 33 40 28 31 27 26 26 34 34 38
21 23 35 39 32 22 35 24

Class interval	Class centre	Tally	Frequency
21–25	23	HHH II	7
26–30	28	HHH II	7
31–35	33	HHH HHH I	11
36–40	38	HHH	5

- 3 A **dot plot** can also be used to represent data in graphical form. For example, use the dot plot to complete a frequency distribution table.



Score	Frequency
16	3
17	5
18	2
19	4

- 4 Another form of data representation is the **stem-and-leaf plot**. For example, draw a back-to-back stem-and-leaf plot for the heights of boys and girls in class 7M1.
Boys (cm): 147, 138, 142, 143, 153, 158, 162, 157, 161, 155, 145, 153
Girls (cm): 138, 143, 145, 148, 151, 146, 163, 134, 143, 146, 148, 145

- Many girls' heights are **clustered** in the 140s.
- 163 cm is an **outlier** for the girls as it is a score which is much higher than the nearest score.

Boys	Girls
8	13 4 8
7 5 3 2	14 3 3 5 5 6 6 8 8
8 7 5 3 3	15 1
2 1	16 3

Checklist

Can you:

- Understand the terms **discrete**, **continuous**, **clustered** and **outlier**?
- Draw a **frequency histogram** and **frequency polygon**?
- Draw a **dot plot** and **stem-and-leaf plot**?


☐
☐
☐

DATA REPRESENTATION

Data Representation and Interpretation



SKILLS CHECK

- 1 Use the frequency table to draw a frequency histogram and polygon.

Score	Frequency
21	4
22	8
23	10
24	7
25	3

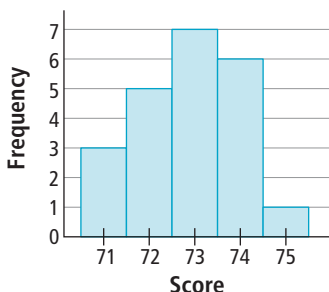


- 2 The masses (in kg) of students in class 7B are listed below. Complete the table.

62 65 58 59 64
 51 48 46 53 65
 69 71 63 62 54
 52 54 61 64 67
 48 53 64 68 61
 54 59 53 49 58

Class interval (kg)	Class centre (kg)	Tally	Frequency
46–50			
51–55			
56–60			
61–65			
66–70			
71–75			

- 3 Use the frequency histogram to complete the frequency distribution table.



Score	Frequency

- 4 Draw a stem-and-leaf plot for the following data:

77 68 79 84 51 57 53 69 73 81 78 61 58 69 78 79
 91 84 80 71 76 82 71 60 63 67 85 90 70 73 78 89

- 5 A stem-and-leaf plot records the scores in the year 7 English test. Transfer the data to the table.

Stem	Leaf
2	2 7 8 8 9
3	3 4 7 7 8 8 9
4	0 0 3 4 4 5 6
5	1 2 3 8 9
6	3 4 4 7 8 8

Class interval	Class centre	Frequency
20–29		
30–39		
40–49		
50–59		
60–69		



PAGE 143

See worked solutions

Answers

DATA REPRESENTATION

Data Representation and Interpretation



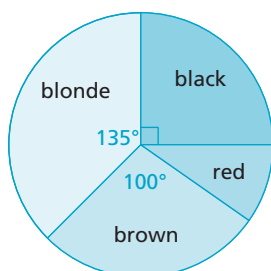
INTERMEDIATE TEST

- 1 A die is tossed 35 times and the results recorded below.

5 2 4 1 4 4 3 6 5
2 1 2 4 2 3 6 4 5
4 3 1 2 3 4 2 4 1
3 4 5 4 3 2 3 4

- a Complete a frequency table. (3 marks)
b Draw a frequency histogram and frequency polygon. (3 marks)
c How many times did a number less than 3 occur? (1 mark)

- 2 A survey is conducted to determine the hair colour of 72 students in year 7. The results are shown in the sector graph below.

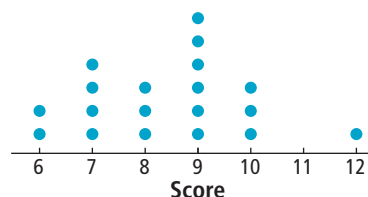


- a Complete the table below. (2 marks)
Hint 1

Colour	Angle	Frequency
blonde		
brown		
black		
red		

- b Draw a column graph. (3 marks)

- 3 The dot plot below shows the shoe sizes of 19 students.



- a Identify the outlier. *Hint 2* (1 mark)
b Draw a frequency table. (2 marks)
c What is the most popular size? (1 mark)
c What is the range of shoe sizes? (1 mark)

- 4 The stem-and-leaf plot below shows the results of a 'beep fitness' test for a class of students in Year 7. The data has been presented in tenths of a second. This means, for example, that 7.8 seconds is shown as 78 tenths of a second.

Boys	Girls
9 7 5 2	4 3 6 7
5 3 6	5 0 1 6 7 7
8 6 6 2	2 3 6 8
7 6 4 3 3 1	8
5 2 9	

- a Find the number of boys involved. (1 mark)
b If the lowest score is 4.3, find the highest score for the class. (1 mark)
c Draw a frequency table for the class. (3 marks)
d Draw a frequency histogram and frequency polygon. (4 marks)

Hint 1: A revolution measures 360° .

Hint 2: An outlier is an individual score that is separate from other scores.

Your Feedback

$$\frac{\boxed{}}{26} \times 100\% = \boxed{}\%$$



PAGE 143



PAGE 161

DATA REPRESENTATION

Data Representation and Interpretation



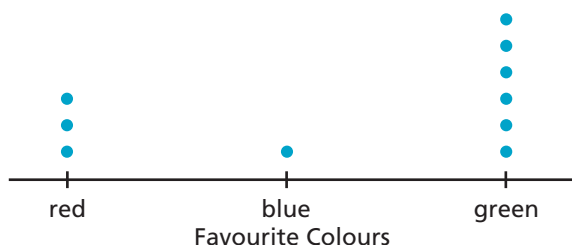
ADVANCED TEST

- 1 The divided bar graph shows the way Marg spends her wage each week.

Rent	Food	Savings	Other
------	------	---------	-------

- a If she earns \$1200 each week, how much does she spend on
- food? (1 mark)
 - rent? (1 mark)
- b If she spends \$360 on rent, how much does she
- save? (1 mark)
 - spend on food, savings and other activities? (1 mark)

- 2 A survey of ten students found their favourite colours. The results are shown in the dot plot. Draw a divided bar graph to represent the data. (2 marks)



- 3 The stem-and-leaf plot shows the results of a maths test. Complete the frequency table for the data. (1 mark)

Stem	Leaf	Marks	Students
6	0 7 8	60–69	
7	2 2 4 8 9	70–79	
8	3 5 7 8	80–89	
9	0 0 2 5	90–99	

- 4 A group of students was surveyed to find the number of pets at home. The results were recorded on a divided bar graph without labelling. There were twice as many dogs as cats. There were some rabbits and two birds.



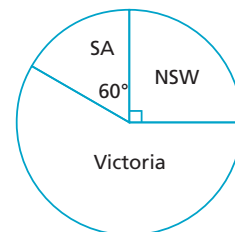
- a Label the graph. (1 mark)
- b How many pet rabbits? (1 mark)
- c If the data were recorded on a sector graph, what angle is used to represent dogs? (1 mark)

- 5 The graph shows the amount of time Liam spends on different activities at the gym.

Bike	Treadmill	Weights
------	-----------	---------

- a What percentage of the time does he spend on:
- treadmill?
 - weights? (1 mark each)
- b If he spends an hour at the gym, how long does he spend on the:
- bike?
 - treadmill? (1 mark each)
- c If he rides the bike for a quarter of an hour, how long does he spend on the:
- treadmill?
 - weights? (1 mark each)

- 6 A survey of people found the state where they were born.



- a Draw a divided bar graph for the data. (2 marks)
- b If there were 36 people surveyed, how many were born in:
- NSW?
 - Victoria? (1 mark each)
- c If 18 people were born in NSW, how many were:
- involved in the survey? (1 mark)
 - born in SA? (1 mark)
 - born in Victoria? (1 mark)

- 7 The table shows the masses of a group of students.

Girls	42, 53, 49, 45, 46, 40, 39, 51, 53
Boys	42, 46, 59, 46, 61, 47, 42, 49, 58

Complete the ordered back-to-back stem-and-leaf plot. (2 marks)

Girls		Boys
	3	
	4	
	5	
	6	

Your Feedback

$$\frac{\boxed{}}{25} \times 100\% = \boxed{}\%$$



DATA ANALYSIS

Data Representation and Interpretation



STUDY NOTES

- 1 Data are collected using a census or a sample. A **census** involves collecting data about every individual in the **whole population**. For example, the Australian Bureau of Statistics (ABS) conducts a census of the Australian population every five years. A **sample** involves collecting data from **part of the population**. If a large enough sample is taken, we can get some idea about the whole population. For example, to ascertain the popularity of the Prime Minister, a phone call of 1000 adults might be conducted.
- 2 A calculator can be used in a **random sample**. For example, one thousand students are each allocated a number from 0 to 999. The random number generator on the calculator can be used to choose 20 students at random.
- 3 A sample is **biased** if it does not fairly represent the whole population. For example, a sample of 1000 adults to ascertain the popularity of the Prime Minister would be biased if all the adults sampled lived in the same suburb. In order to be fair, the sample would have to include adults from different parts of Australia and from different age groups.
- 4 **Measures of location** are mean, median and mode.
- 5 The **mean** ($\bar{x}$) is the average of a set of scores, where $\bar{x} = \text{sum of scores} \div \text{number of scores}$.
For example, find the mean of 3, 7, 6, 4, 2. $\bar{x} = \frac{3 + 7 + 6 + 4 + 2}{5} = 4.4$
- 6 The mean can also be found by placing your **calculator in statistics (STAT) mode**. (Check the instructions that came with your calculator.)
- 7 The **median** is the middle of the scores when the scores are arranged in order.
For example, find the median of the following scores:

a 4, 8, 8, 6, 2, 9, 1 i.e. 1, 2, 4, 6, 8, 8, 9 $\therefore$ median is 6	b 34, 4, 62, 48 i.e. 4, 34, 48, 62 As there are an even number of scores, the median is the average of 34 and 48 $\therefore$ median is 41
--	---
- 8 The **mode** is the most common score—the score with the highest frequency.
For example, find the mode of the following scores:

a 14, 4, 7, 4, 8, 11 The number 4 occurs most often (twice) $\therefore$ mode is 4	b 9, 8, 6, 2, 3, 9, 7, 8 The numbers 8 and 9 occur most often (twice each) $\therefore$ mode is 8 and 9
---	--
- 9 A **measure of spread** is the range. The **range** of a set of scores is the highest score minus the lowest score. For example, find the range of the following scores:

a 12, 8, 43, -4, 32 Range is $43 - (-4) = 43 + 4 \therefore$ range is 47	b 23.4, 1.3, 7.43, 4.02 Range is $23.4 - 1.3 \therefore$ range is 22.1
--	--
- 10 Scores may be **clustered** together or an **outlier** might exist. An outlier is a score much lower or higher than other scores. For example, in the scores 3, 8, 5, 7, 6, 6, 31, 6, the scores are clustered about 6 and there is an outlier of 31.

Checklist

Can you:

- 1 Recognise the difference between a census and a sample?
- 2 Find measures of location (mean, median, mode)?
- 3 Use the calculator to find the mean?
- 4 Find a measure of spread (range)?

☐
☐
☐
☐

DATA ANALYSIS

Data Representation and Interpretation



SKILLS CHECK

1 Would we use a sample or a census to answer the following statements?

- a What is the population of NSW?
- b Who is likely to be the next Prime Minister?
- c Who is 7M3's favourite teacher?
- d How many students in year 7 have braces?

2 A survey of 100 students is conducted to find out whether the students want a change in the school uniform.

Uniform survey results

	Change	No change
Male	20	34
Female	20	26

- a What percentage of students do not want a change in the uniform?
- b Of those students who want a change, what percentage are female?

3 Find the mean of the following:

- a 4, 7, 8, 4, 2
- b 3, 11, 14, 7, 6, 7
- c 0.4, 2.56, 3.84, 4
- d -4, 7, 6, 8, -2

4 The mean of eight scores is 6. Find the value of the pronumeral, if the scores are:

- a 2, 5, 6, 10, 15, 3, x , 5
- b 3, y , 6, 9, 2, -1, 4, 8

5 Calculate the mean correct to 2 decimal places:

- a 3, 6, 8, 9, 2, 3, 3, 3, 5, 4, 4, 7, 8, 3, 9
- b 12, 16, 13, 15, 12, 15, 18, 16, 15, 11, 18

6 The mean of five scores is 10. If another score is added, the mean increases to 12. Find the new score.

7 Find the median of the following:

- a 35, 14, 6, 25, 11
- b 98, 43, 56, 2, 76, 44, 41, 44, 58, 56

8 What is the mode of:

- a 3, 17, 4, 3, 8, 14, 15?
- b 12, -4, 9, 11, 9, 6, 81, 4, 12?

9 Find the range of:

- a 12, 7, 4, 2, 5
- b 3, 6, -1, -15, 2, 7, 4, 6, 8, 2, -1, 0, 11

10 Two groups of students were given the following marks for their French assignments:

Group 1: 5, 5, 6, 7, 6, 7, 5, 7, 6, 6

Group 2: 9, 8, 7, 2, 4, 7, 5, 8, 7, 3

Compare the groups in regard to:

- a mean
- b median
- c mode
- d range

11 The following scores are arranged in ascending order. The median is the same as the range. Find the value of x :

- a 2, 3, 5, x , 8, 9
- b x , 2, 2, 4, 5, 5



PAGE 145

Answers 1a census b sample c census d census 2a 60% b 50% c 2.7 d 3 4a $x = 2$ b $y = 17$ 5a 5.13 b 14.64 6 22 7a 14 b 50 8a 3 b 9 and 12 9a 10 b 26 10 see worked solutions 11a $x = 7$ b $x = 2$

DATA ANALYSIS

Data Representation and Interpretation



INTERMEDIATE TEST

Part A Multiple Choice

- The mean of the scores 4, 7, 2, 8, 6, 4, 3, 0, 1, 5 is:
A 3 **B** 4 **C** 5 **D** 35.2 (1 mark)
- The median of the scores 4, x , 2, 10 is 6. The value of x is:
A 4 **B** 6 **C** 8 **D** 9 (1 mark)
- Find the mode of the scores 4, 2, 8, 6, 4, 5, 7, 12, 8, 4.
A 2 **B** 3 **C** 4 **D** 5 (1 mark)
- The range of the scores 4, 2, 5, -1 , y , 3 is 10. The value of y could be:
A 11 **B** 8 **C** 9 **D** 10 (1 mark)
- Five students scored marks in their English and science tests as noted in the table. Which one of the following is correct?
A The range of English marks is 11.
B The mode of the science marks is 75.
C The median of the English marks is more than the median of the science marks.
D The mode of the English marks is less than the mode of the science marks. (1 mark)

Test marks

Students	A	B	C	D	E
English	68	71	68	80	74
Science	75	68	73	79	79

Part B Short Answer

- For the scores 9, 6, 5, 5, 2, 3, 5, find the:
a mean **b** median **c** mode **d** range (1 mark each)
- For the scores 4, 0, 3, 5, 11, -3 , 6, 3, 5, 9, find the:
a mean **b** median **c** mode **d** range (1 mark each)
- After four maths tests Jo's mean is 76. As an incentive, her parents have offered to buy her a mobile phone if she can increase the mean to 80 following her next test. What mark will Jo need to score to receive the phone? *Hint 1* (2 marks)
- In February the Harvey family decided to record the age and height of each member of the family. The results appear in the table. Find the mean age and mean height of the Harvey family as at February. (2 marks)

	Cliff	Anne	Fiona	Craig	Jason
Age (years)	42	42	14	11	6
Height (cm)	176	172	165	158	145
- The heights, in cm, of the players on two junior boys basketball teams are as follows:
 Tigers: 163, 168, 171, 163, 165, 166, 172, 160 Eagles: 171, 163, 170, 173, 159, 172, 164, 164
 Compare the two teams, commenting on measures of location and spread. *Hint 2* (4 marks)

Hint 1: First find the sum of the four scores.

Hint 2: Find the mean, median, mode and range of both teams.

Your Feedback

$$\frac{\boxed{}}{21} \times 100\% = \boxed{}\%$$



PAGE 146



PAGE 161

DATA ANALYSIS

Data Representation and Interpretation

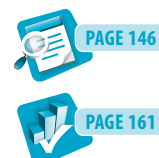


ADVANCED TEST

- 1 The mean mass of Ben, Ken and Len is 52 kg. If Ben's mass is 48 kg and Ken's mass is 50 kg, what is Len's mass? (2 marks)
- 2 A company's mean profit for the first four months of the year was \$120 000. The profit in May was \$150 000 and in June \$180 000. What was the mean monthly profit in the six months? (2 marks)
- 3 A set of four different numbers has a range of 6 and a mean of 6. None of the numbers are 6. What is a possible set of numbers? (1 mark)
- 4 The median of four scores is 6.5. If the range is 3 and the mode is 7, find the four scores. (1 mark)
- 5 A score was added to the set of scores:
4 6 6 8 8 12
What was the new score if the new
a mode is 6? b mean is 7?
c median is 7? d range is 12? (1 mark each)
- 6 The mean of five scores is 9. When one of the scores changes, the mean increases by 2. What is the change in the score? (2 marks)
- 7 The number of goals scored by Mark's football team in five games is listed below:
4 2 4 2 2
In the sixth game, no goals were scored.
Comment on the change to the:
a mode b median
c range d mean (1 mark each)
- 8 A maths quiz taken by five students is marked out of 10 and the results are whole numbers. Give a possible set of students' results, if the:
a median is 6, the range is 6, mode is 6 and the mean is 7. (1 mark)
b median is 6, the range is 9, mode is 6 and the mean is 5. (1 mark)
- 9 In four games a hockey team scored an average of three goals. In the fifth game the team won by five goals, and their overall game average increased by one goal. What was the final score in the fifth game? (2 marks)
- 10 Find the mean, mode, median and range of the following:
a 0.4, 0.04, 0.4, 0.04, 4, 0.4 (4 marks)
b $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, \frac{1}{3}, \frac{1}{4}$ (4 marks)
c 4, -3, 2, -1, -1, 1, -2 (4 marks)
- 11 The mean of four scores is 8. When another two scores are included, the mean increases by 4. If one of the new scores is 12, what is the other new score? (2 marks)
- 12 A set of seven scores has a median of 6. Two new scores are added to the set. What will be the new median, if the new scores are 5 and 10? (1 mark)
- 13 The mean of a set of ten marks is 4. When another two marks are included, the mean doubles. What is the mean of the two additional scores? (2 marks)
- 14 The heights of students in a class were recorded and the average was 140 cm. Joshua and Mia were absent. When their heights were included in the class data, the mean height did not change. If Joshua's height was 143 cm, what was Mia's height? (2 marks)
- 15 Sheridan has completed four tests and her mean mark is 70%. What mark (as a percentage) will she need to get in her next test to increase the mean to 75%? (2 marks)
- 16 This set of data is arranged in ascending order.
1, 3, 4, x , 8, 8.
What will be the value of x , if the:
a mean is 5? (2 marks)
b median is 6? (1 mark)
- 17 The mean temperature over five mornings in a ski village was -3°C . When the temperature had been measured on the sixth morning the mean had increased by one degree. What was the temperature on the sixth morning? (2 marks)
- 18 Here are three scores: x , 4, y . The median and the range are both 3. What are the missing scores? (2 marks)
- 19 The Bardy family has four boys and two girls. The mean age of the boys is 12 and the mean age of the girls is 6. What is the mean age of the six children? (2 marks)

Your Feedback

$$\frac{\boxed{}}{50} \times 100\% = \boxed{}\%$$



INTERPRETING DATA FROM GRAPHS

Data Representation and Interpretation



STUDY NOTES

1 A frequency table can be used to find measures of location:

- **mean**—by inserting an additional column, frequency $\times$ score (fx);
- **median**—by using the frequency column to find the middle score;
- **mode**—the score with the highest frequency;
- **range**—highest score minus lowest score.

For example, complete the table (right) and then find the mean, median and mode.

$$\text{Mean} = \frac{\sum fx}{\sum f} \quad [\Sigma \text{ means 'sum of'}]$$

$$= \frac{102}{19} = 5.37 \quad (\text{correct to 2 decimal places})$$

Median: the scores have been arranged in ascending order. There are 19 scores, so the middle score will be the 10th score. Working down the frequency column from the top row, we can see that the 10th score is a 5 (there are four scores of 4 and six scores of 5)
 $\therefore$ median = 5.

Mode: the score with the highest frequency of 7 was 6 $\therefore$ mode = 6.

Score (x)	Frequency (f)	fx
4	4	16
5	6	30
6	7	42
7	2	14
Totals	$\Sigma f = 19$	$\Sigma fx = 102$

2 A dot plot, frequency histogram or frequency polygon can also be used to find measures of location:

- **mean**—by using the formula, sum of scores $\div$ number of scores;
- **median**—by crossing off the high and low scores in pairs to find the middle score;
- **mode**—the score with the tallest column. For example, find the mean, median and mode of the data represented by the dot plot at right.

$$\text{Mean} = \frac{(16 \times 3) + (17 \times 4) + (18 \times 6) + (19 \times 4) + (20 \times 2)}{4 + 7 + 5 + 3 + 1}$$

$$= \frac{340}{19} = 17.89 \quad (\text{correct to 2 decimal places})$$

Median: cross off high and low scores in pairs. We end in the middle column $\therefore$ median = 18

Mode = 18



3 A stem-and-leaf plot can also be used to find measures of location:

- **mean**—by using a formula or the calculator;
- **median**—by crossing off the high and low scores in pairs to find the middle score;
- **mode**—look for the most common score.

For example, find the mean, median and mode of the data represented by the stem-and-leaf plot at right.

Mean: place calculator in STAT mode $\therefore$ mean = 82

Median: first ensure that the stem-and-leaf plot is ordered, cross off high and low scores in pairs. We are left with scores 80 and 82. $\therefore$ median = 81 [half-way between 80 and 82] Mode: = 87

6	0	3	4	9				
7	0	0	1	2	6	8	9	
8	0	2	7	7	7	9		
9	3	5	6	7	9			
10	2	2						

Checklist

Can you:

- 1 Calculate the mean, median, mode and range from a frequency table?
- 2 Calculate the mean, median, mode and range from a dot plot, histogram or polygon?
- 3 Calculate the mean, median, mode and range from a stem-and-leaf plot?


☐
☐
☐

Data Representation and Interpretation



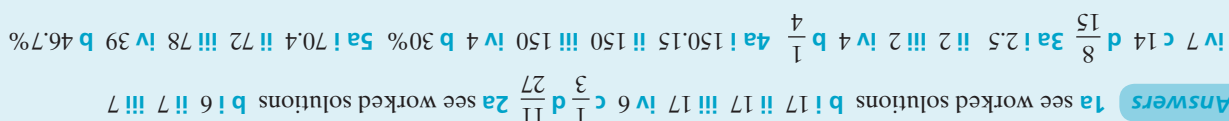
SKILLS CHECK

- | Score (x) | Frequency (f) | fx |
|---------------|-------------------|-------------------|
| 3 | 7 | |
| 5 | | 35 |
| | 12 | |
| 10 | | |
| Totals | $\Sigma f = 30$ | $\Sigma fx = 180$ |

-
- Car ownership**
- | Score (cars) | Frequency |
|--------------|-----------|
| 1 | 4 |
| 2 | 7 |
| 3 | 5 |
| 4 | 3 |
| 5 | 1 |

-
- | Score (toothpicks) | Number of toothpicks |
|--------------------|----------------------|
| 148 | 2 |
| 149 | 3 |
| 150 | 4 |
| 151 | 3 |
| 152 | 2 |

- | Test results | | | | |
|--------------|---|---|---|-----|
| 5 | 0 | 2 | 9 | |
| 6 | 0 | 4 | 7 | 8 |
| 7 | 2 | 4 | 8 | 8 9 |
| 8 | 1 | 5 | 9 | |



INTERPRETING DATA FROM GRAPHS

Data Representation and Interpretation



INTERMEDIATE TEST

Part A Multiple Choice

- 1 The $\square$ in the table at right represents a digit in the stem-and-leaf plot. The scores are arranged in ascending order. If the median has the same value as the range, then $\square$ is: *Hint 1*

A 5

B 6

C 7

D 8

1	2	8							
2	0	4	5	6	9				
3	0	3	3	5	7	8			
4	1	3	5	$\square$					

(1 mark)

- 2 The value of y in this frequency table is: *Hint 2*

A 30

B 35

C 40

D 45

Score (x)	Frequency (f)	fx
2	5	
4		32
5		y
	3	
Totals	$\Sigma f = 25$	$\Sigma fx = 108$

(1 mark)

- 3 The median of the data represented by this frequency table is 6 and the mode is two more than the range. If $x < y$ then the value of x is:

A 1

B 2

C 3

D 4

Score	Frequency
x	5
y	8

(1 mark)

Part B Short Answer

- 4 Use the dot plot to find the:

a mean of the scores

b mode

c median

d range



(2 marks)

(1 mark)

(1 mark)

(1 mark)

- 5 A survey of fifteen students was conducted to find the number of tablets in the family household. The results appear in the frequency histogram.

a Find the following: *Hint 3*

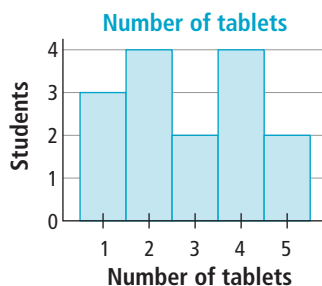
i the mean score to 1 decimal place

ii the median

iii the mode

iv the range

b A student is chosen at random. What is the probability that there is one tablet in the family household?



(2 marks)

(1 mark)

(1 mark)

(1 mark)

(1 mark)

Hint 1: First find the median.

Hint 2: Complete the frequency table.

Hint 3: The data could be summarised in a frequency table.

Your Feedback

$$\frac{\boxed{}}{14} \times 100\% = \boxed{}\%$$



PAGE 149



PAGE 161

INTERPRETING DATA FROM GRAPHS

Data Representation and Interpretation



ADVANCED TEST

- 1 The stem-and-leaf plot shows the results of a science test.

Stem	Leaf
5	0 9
6	2 3 7 9
7	0 0 4 5 6
8	2 3 7
9	1

What are the mode, range and median?

(3 marks)

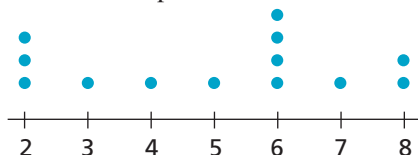
- 2 A set of scores is recorded in a table.

Score	Frequency
6	3
7	5
8	4
9	8
10	11

What are the mode, range and median?

(3 marks)

- 3 Consider the dot plot.



What are the mode, range, median and mean?

(4 marks)

- 4 A back-to-back stem-and-leaf plot records the heights, in cm, of a group of young people.

Boys		Girls
	13	3 7
9 7 7 6 3	14	2 5 8 9
8 4 4 4 0 0	15	0 0 4 5
5 5 3	16	1

- What is the mode, range and median of the boys? (3 marks)
- What is the mode, range and median of the girls? (3 marks)
- What is the mode, range and median of the whole group? (3 marks)
- A person is chosen at random. What is the probability that the person has a height of 150 cm? (1 mark)

- 5 A set of scores has been recorded in a table:

Score	Frequency
4	5
5	x
6	2

What are the possible values of x , if the:

- median is 4?
- mode is 5?
- mean is 4.7? (1 mark each)

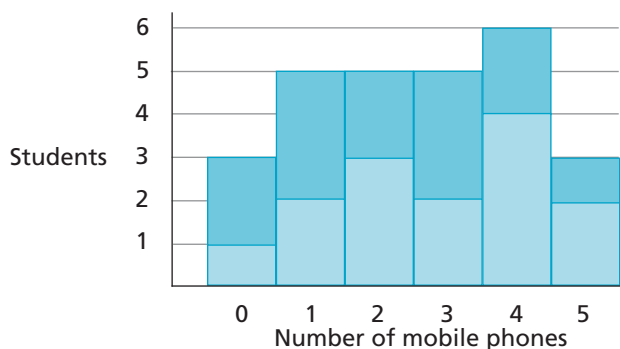
- 6 A stem-and-leaf plot is shown below.

Stem	Leaf
3	a 3 4
4	0 0 5 7 b
5	2 3 4 4 4
6	5 8 9

What is the value of:

- a , if the range is 37? (1 mark)
- b , if the median is 50.5? (1 mark)

- 7 The boys and girls in a year seven class are surveyed to find the number of mobile phones in their homes.



Key ■ : Boys ■ : Girls

- How many students were surveyed? (1 mark)
- How many girls were surveyed? (1 mark)
- How many boys had 5 mobiles in their homes? (1 mark)
- What was the total number of mobile phones? (2 marks)
- What was the modal number of phones for the:
 - group?
 - girls? (1 mark each)
- What was the median for the:
 - group?
 - girls? (1 mark each)
- Find the mean number of phones for the:
 - group
 - girls (1 mark each)

Your Feedback

$$\frac{\boxed{}}{36} \times 100\% = \boxed{}\%$$





ANGLES AND LINES

SKILLS CHECK

PAGE 59

- 1 a $\angle ABC$ or $\angle CBA$ or $\angle B$
b $\angle FEG$ or $\angle GEF$
- 2 a 62° , acute
b 355° , reflex
c 151° , obtuse
- 3 a $\angle ADB$ or $\angle BEC$, others
b $\angle DAB$, $\angle BAC$, others
c $\angle DAB$ and $\angle BAC$, $\angle DBA$ and $\angle ABC$, others
- 4 a As $90 - 72 = 18$
 $\therefore$ complement is 18°
b As $180 - 100 = 80$
 $\therefore$ supplement is 80°
c As 90 minus $x = 90 - x$
 $\therefore$ complement is $(90 - x)^\circ$
d As 180 minus $y = 180 - y$
 $\therefore$ supplement is $(180 - y)^\circ$
- 5 a $x = 180 - 68$ (straight angle is 180°)
 $= 112$
 $\therefore x = 112$
b $y = 90 - 35$ (right angle is 90°)
 $= 55$
 $\therefore y = 55$
c $a = 360 - (140 + 160)$ (revolution is 360°)
 $= 360 - 300$
 $= 60$
 $\therefore a = 60$
- 6 a Using 'corresponding angles in parallel lines equal'
 $x = 58$
Using 'vertically opposite angles equal'
 $y = 58$
 $\therefore x = 58, y = 58$
b Using 'alternate angles in parallel lines equal'
 $x = 76$
Using 'straight angle is 180° '
 $y = 180 - 76$
 $= 104$
 $\therefore x = 76, y = 104$
c Using 'corresponding angles in parallel lines equal'
 $x = 70$
Using 'straight angle is 180° '
 $y = 180 - (70 + 60)$
 $= 180 - 130$
 $= 50$
 $\therefore x = 70, y = 50$

WORKED SOLUTIONS



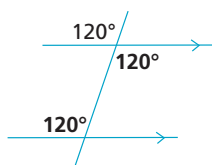
CHECK YOUR SOLUTIONS

- 7 a $x = 180 - 135$ (straight angle)
 $= 45$
 b $x = 360 - (90 + 140)$ (revolution)
 $= 360 - 230$
 $= 130$
 c $x = 125$ (corresponding angles, parallel lines)
 or (corr. $\angle$ s, $\parallel$ lines)

ANGLES AND LINES

INTERMEDIATE TEST PAGE 60

1



$x = 120$ (vert. opp $\angle$ s)
 $y = 120$ (corresp. $\angle$ s equal, $\parallel$ lines)
 $\therefore x = 120, y = 120$ **B** ✓

(1 mark)

2

Complementary $\angle$ s add up to 90°
 As $75 + 15 = 90$,
 then the complement is 15° **B** ✓

(1 mark)

3

Supplementary $\angle$ s add up to 180°
 As $\angle ACB$ and $\angle DCB$ form a straight line
 (180°), they are supplementary. **C** ✓

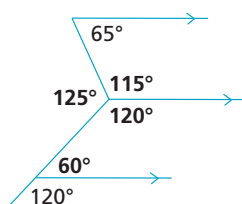
(1 mark)

4

Try each of the alternatives.
 $x = 105$ (co-interior $\angle$ s, $AB \parallel CD$) **D** ✓

(1 mark)

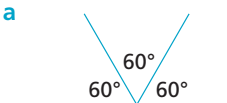
5



Try each of the alternatives.
 $a = 115$ (co-interior $\angle$ s, $\parallel$ lines)
 $b = 60$ ($\angle$ s in a straight line)
 $c = 120$ (corresp. $\angle$ s, $\parallel$ lines)
 $d = 360 - (115 + 120)$ ($\angle$ s in a revolution)
 $= 360 - 235$
 $= 125$
 $\neq 135$ **D** ✓

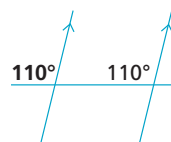
(1 mark)

6



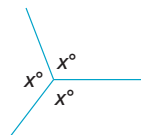
$x + x + x = 180$ ($\angle$ s in a straight line) ✓
 $3x = 180$
 $x = 60$ ✓

b



$2x = 110$ (corresp. $\angle$ s, $\parallel$ lines) ✓
 $x = 55$ ✓

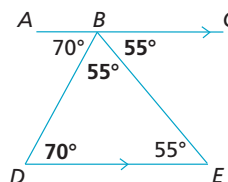
c



$x + x + x = 360$ ($\angle$ s in a revolution) ✓
 $3x = 360$
 $x = 120$ ✓

(6 marks)

7



$\angle BDE = 70^\circ$ (alt. $\angle$ s, $AC \parallel DE$) ✓✓
 $\angle CBE = 55^\circ$ (alt. $\angle$ s, $AC \parallel DE$) ✓✓
 $\angle DBE = 55^\circ$ ($\angle$ s in a straight line) ✓✓

(6 marks)

ANGLES AND LINES

ADVANCED TEST

PAGE 61

1

- a $x = 43$
 $y = 137$ ✓
 b $x = 360 - (150 + 80)$
 $= 360 - 230$
 $= 130$ ✓
 c $2x + 90 = 360$
 $2x = 360 - 90$
 $2x = 270$
 $x = 135$ ✓

(3 marks)

2

- a $2x + 10 + 50 = 180$ ✓
 $2x + 60 = 180$
 $2x = 180 - 60$
 $2x = 120$
 $x = 60$ ✓
 b $2x + 10 = x + 40$ ✓
 $2x - x = 40 - 10$
 $x = 30$ ✓
 c $2x + 10 + 3x + 2x = 360$ ✓
 $7x + 10 = 360$
 $7x = 360 - 10$
 $7x = 350$
 $x = 50$ ✓

(6 marks)

WORKED SOLUTIONS

CHECK YOUR SOLUTIONS



3 $(90 - y)^\circ$ ✓ (1 mark)

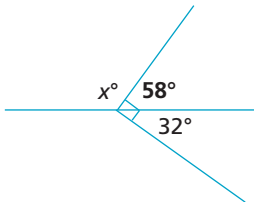
4 $(180 - p)^\circ$ ✓ (1 mark)

5 a $x = 180 - 78$
 $= 102$ ✓

b $x + 70 + 160 = 360$
 $x + 230 = 360$
 $x = 360 - 230$
 $x = 130$ ✓

c $x = 130$ ✓ (3 marks)

6 a



$x = 180 - 58$
 $= 122$ ✓

b $x + 35 + 280 = 360$
 $x + 315 = 360$
 $x = 360 - 315$
 $= 45$ ✓

c $x + 90 + 41 = 180$
 $x + 131 = 180$
 $x = 180 - 131$
 $= 49$ ✓

d $y = 180 - (40 + 60)$
 $= 180 - 100$
 $= 80$ ✓
 $\therefore x = 80$ ✓
 $\therefore z = 180 - 80$
 $= 100$ ✓

e $2x + 70 = 180$
 $2x = 180 - 70$
 $2x = 110$
 $x = 55$ ✓

f $2x + 20 = 90$
 $2x = 90 - 20$
 $2x = 70$
 $x = 35$ ✓ (8 marks)

7 a $2x + 140 + 90 = 360$ ✓
 $2x + 230 = 360$
 $2x = 360 - 230$
 $2x = 130$
 $x = 65$ ✓

b $2y + 30 + y = 90$ ✓
 $3y + 30 = 90$
 $3y = 90 - 30$
 $3y = 60$
 $y = 20$ ✓

c $x + 50 = 120$ ✓
 $x + 50 = 120$
 $x = 120 - 50$
 $x = 70$ ✓

d $4x + 20 + x + 10 = 180$ ✓
 $5x + 30 = 180$
 $5x = 180 - 30$
 $5x = 150$
 $x = 30$ ✓

e $2y + y + 10 + y - 10 = 180$ ✓
 $4y = 180$
 $y = 45$ ✓

f $3x + 2x + 140 + 90 = 360$ ✓
 $5x + 230 = 360$
 $5x = 360 - 230$
 $5x = 130$
 $x = 26$ ✓ (12 marks)

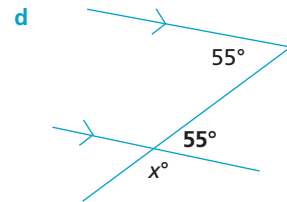
8 $2x + 20 + x + 10 = 90$ ✓
 $3x + 30 = 90$
 $3x = 90 - 30$
 $3x = 60$
 $x = 20$ ✓ (2 marks)

9 $4x + 20 = 2x + 60$ ✓
 $4x - 2x = 60 - 20$
 $2x = 40$
 $x = 20$ ✓ (2 marks)

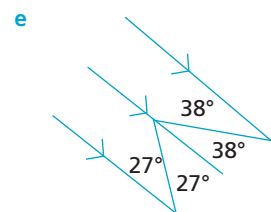
10 $2x + x + 40 + 20 = 180$ ✓
 $3x + 60 = 180$
 $3x = 180 - 60$
 $3x = 120$
 $x = 40$ ✓ (2 marks)

11 a $x = 80$ [alt $\angle$ s, || lines] ✓
 $z = 70$ [alt $\angle$ s, || lines] ✓
 $y = 30$ [straight line] ✓
b $360 - 245 = 115$, then
 $x = 180 - 115$ [co-int $\angle$ s, || lines]
 $= 65$ ✓

c $180 - 70 = 110$, then
 $x + 40 = 110$
 $x = 110 - 40$
 $= 70$ ✓
 $z = 180 - (70 + 70)$
 $= 180 - 140$
 $= 40$ ✓
 $y = 180 - 40$
 $= 140$ ✓



$x = 180 - 55$
 $= 125$ ✓



$x = 27 + 38$
 $= 65$ ✓

f $x = 50$ [alt $\angle$ s, || lines] ✓
 $60 + 50 + y + 35 = 180$
 $y + 145 = 180$
 $y = 180 - 145$
 $= 35$ ✓ (11 marks)

12 a $3x + 10 = 2x + 40$ ✓
 $3x - 2x = 40 - 10$
 $x = 30$ ✓

b $6x - 10 = 4x + 30$ ✓
 $6x - 4x = 30 + 10$
 $2x = 40$
 $x = 20$ ✓

c $3x + 40 + x + 20 = 180$ ✓
 $4x + 60 = 180$
 $4x = 180 - 60$
 $4x = 120$
 $x = 30$ ✓ (6 marks)

WORKED SOLUTIONS



CHECK YOUR SOLUTIONS

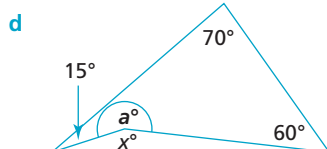
TRIANGLES AND QUADRILATERALS

SKILLS CHECK

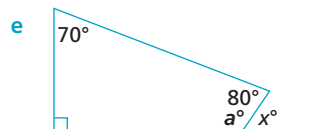
PAGE 64

- 1 a $x = 180 - (80 + 55)$ ($\angle$ sum of Δ)
 $= 180 - 135$
 $= 45$
- b $b = 180 - (70 + 70)$ (isos. Δ and $\angle$ sum of Δ)
 $= 180 - 140$
 $= 40$
- c $a = 360 - (110 + 80 + 70)$ ($\angle$ sum of quad.)
 $= 360 - 260$
 $= 100$
- d $x = 180 - 120$ (straight $\angle$)
 $= 60$
 $\therefore y = 120 - 40$ (ext. $\angle$ of Δ equals sum of 2 int. opp. $\angle$ s)
 $= 80$
- e $t = 180 - 60$ (straight $\angle$)
 $= 120$
- f $q = 360 - (90 + 80 + 80)$ ($\angle$ sum of quad.)
 $= 360 - 250$
 $= 110$

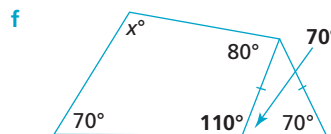
- 2 a $2x = 360 - (160 + 100 + 40)$
 $= 360 - 300$
 $\frac{2x}{2} = \frac{60}{2}$
 $x = 30$
- b $x = 360 - (90 + 40 + 200)$
 $= 30$
- c $2a + 30 + 110 + 3a + 60 + 50 = 360$
 $5a + 250 = 360$
 $\frac{5a}{5} = \frac{110}{5}$
 $a = 22$



First find a :
 $70 + 60 + 15 + a = 360$
 $a + 145 = 360$
 $a = 360 - 145$
 $a = 215$
 $\therefore x = 360 - 215 = 145$

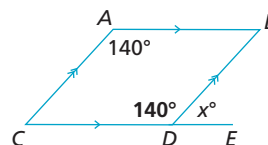


First find a : $a = 360 - (90 + 70 + 80)$
 $= 360 - 240 = 120$
 $\therefore x = 180 - 120 = 60$



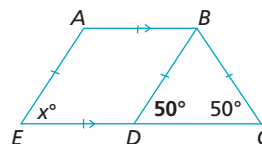
$x = 360 - (70 + 110 + 80)$
 $= 360 - 260 = 100$

3 a



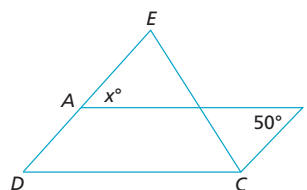
$\angle BDC = 140$ (opp. $\angle$ s of ||ogram equal)
 $x = 40$ (straight $\angle$)

b



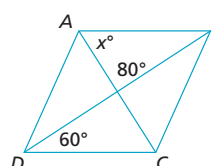
$\angle BDC = 50^\circ$ (base $\angle$ s of isos. Δ)
 $ABED$ is a rhombus (opp. sides parallel, adjacent sides equal)
 $x = 50$ (corr. $\angle$ s, $AE \parallel BD$)

4 a



$\angle ADC = 50^\circ$ (opp. $\angle$ s of ||ogram equal)
 $x = 50$ (corr. $\angle$ s, $AB \parallel DC$)

b



$\angle ABD = 60^\circ$ (alt. $\angle$ s, $AB \parallel DC$)
 $x = 40$ ($\angle$ sum of Δ)

WORKED SOLUTIONS

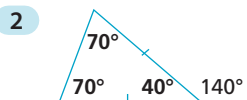
CHECK YOUR SOLUTIONS

TRIANGLES AND QUADRILATERALS

INTERMEDIATE TEST PAGE 65

- 1 Angle sum is 360° . **C** ✓

(1 mark)

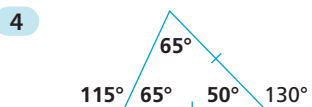


$c = 40$ ($\angle$ s in a straight line)
 Isosceles Δ therefore both other $\angle$ s equal.
 $2d = 180 - 40$ ($\angle$ sum of Δ)
 $2d = 140$
 $d = 70$
 $\therefore c = 40, d = 70$ **D** ✓

(1 mark)

- 3 Let the missing angle be x .
 $40 + 57 + x = 180$ ($\angle$ sum of Δ)
 $x + 97 = 180$
 $x = 83$

$\therefore$ missing angle is 83
 i.e. triangle is scalene as all angles are different
 in size, and acute ($40^\circ, 57^\circ$ and 83°) **D** ✓ (1 mark)



$x = 115^\circ$ **B** ✓

(1 mark)

- 5 Quadrilateral cannot be a trapezium. **D** ✓ (1 mark)

- 6 The quadrilateral is a kite. **A** ✓

(1 mark)

- 7 a $x = 180 - (90 + 72)$ ($\angle$ sum of Δ)
 $= 180 - 162$
 $= 18$
 $y = 90 + 72$ (ext. $\angle$ of Δ equals sum of 2 int. opp. $\angle$ s)
 $= 162$
 $\therefore x = 18, y = 162$ ✓✓

- b $x = 70$ (base $\angle$ s of isos. Δ)
 $70 + y = 110$ (co-int. $\angle$ s, $\parallel$ lines)
 $y = 40$
 $\therefore x = 70, y = 40$ ✓✓

- c $x = 360 - (90 + 90 + 130)$ ($\angle$ sum of quad.)
 $= 360 - 310$
 $= 50$
 $y = 180 - 50$ ($\angle$ s in a straight line)
 $= 130$
 $\therefore x = 50, y = 130$ ✓✓

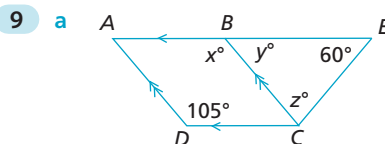
(6 marks)

- 8 a $x = 180 - (70 + 55)$ ($\angle$ sum of Δ)
 $= 180 - 125$
 $= 55$ ✓✓

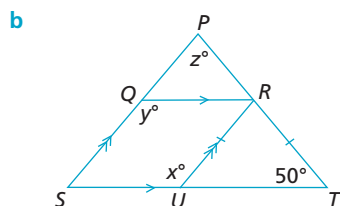
- b $x = 65$ (base $\angle$ s of isos. Δ) ✓✓

- c $x = 360 - (110 + 100 + 60)$ ($\angle$ sum of quad.)
 $= 360 - 270$
 $= 90$ ✓✓

(6 marks)



$x = 105$ (opp. $\angle$ s of parallelogram equal) ✓
 $y = 75$ ($\angle$ s in a straight line) ✓
 $z = 45$ ($\angle$ sum of Δ) ✓



$\angle RUT = 50$ (base $\angle$ s of isos. Δ equal)
 $\therefore x = 130$ ($\angle$ s in a straight line) ✓
 $y = 130$ (opp. $\angle$ s of parallelogram equal) ✓
 Also, $\angle PST = 50$ (corr. $\angle$ s equal, $SP \parallel UR$)
 $z = 80$ ($\angle$ sum of ΔPST) ✓

(6 marks)

TRIANGLES AND QUADRILATERALS

ADVANCED TEST

PAGE 66

- 1 a $x = 180 - (90 + 42)$
 $= 180 - 32$
 $= 48$ ✓

- b As $180 - 150 = 30$, $180 - 155 = 25$, then
 $x + 30 + 25 = 180$
 $x + 55 = 180$
 $x = 180 - 55$
 $= 125$ ✓

- c $z = 180 - (80 + 30)$
 $= 180 - 110$
 $= 70$ ✓
 $y = 180 - 80$
 $= 100$ ✓
 $x = 180 - (70 + 100)$
 $= 180 - 170$
 $= 10$ ✓

- d $x = 180 - (70 + 55)$
 $= 180 - 125$
 $= 55$ ✓

WORKED SOLUTIONS



CHECK YOUR SOLUTIONS

e $x = 180 - (90 + 50)$
 $= 180 - 140$
 $= 40$ ✓

As $40 + 20 = 60$, then

$y = 180 - (90 + 60)$
 $= 180 - 150$
 $= 30$ ✓

f $x = 180 - (90 + 55)$
 $= 180 - 145$
 $= 35$ ✓
 $\therefore y = 35$ ✓
 $z = 180 - (90 + 35)$
 $= 180 - 125$
 $= 55$ ✓

(11 marks)

2 a $2x + 80 + 80 = 180$ ✓
 $2x + 160 = 180$
 $2x = 180 - 160$
 $2x = 20$
 $x = 10$ ✓

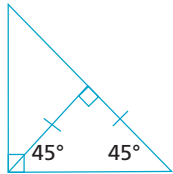
b $y + 75 + 75 = 180$ ✓
 $y + 150 = 180$
 $y = 180 - 150$
 $y = 30$
 $\therefore x = 75$ [alt. $\angle$ s, || lines] ✓

c $x + x + 40 = 180$
 $2x + 40 = 180$
 $2x = 180 - 40$
 $2x = 140$
 $x = 70$ ✓
 $\therefore y = 40$ [alt. $\angle$ s, || lines] ✓

(6 marks)

3 a $x + 35 + 40 + 55 = 180$ ✓
 $x + 130 = 180$
 $x = 180 - 130$
 $x = 50$ ✓

b $z = 90 - 50$
 $= 40$ ✓
 $y = 90 - 40$
 $= 50$ ✓
 $x = 180 - (50 + 90)$
 $= 180 - 140$
 $= 40$ ✓

c 
 $\therefore x = 90 - 45$ ✓
 $= 45$ ✓

(7 marks)

4 a $4x + 3x + 2x = 180$ ✓
 $9x = 180$
 $x = 20$ ✓

b $x + 10 + x + 20 + 120 = 180$ ✓
 $2x + 150 = 180$
 $2x = 180 - 150$
 $2x = 30$
 $x = 15$ ✓

c $2x + 20 + x + 10 + 60 = 180$ ✓
 $3x + 90 = 180$
 $3x = 180 - 90$
 $3x = 90$
 $x = 30$ ✓

(6 marks)

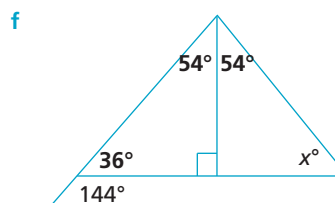
5 a $2x = 63 + 55$ ✓
 $2x = 118$
 $x = 59$ ✓

b $2x + 20 = 90 + 24$ ✓
 $2x + 20 = 114$
 $2x = 114 - 20$
 $2x = 94$
 $x = 47$ ✓

c As $180 - 130 = 50$, then
 $50 + 50 + 2x = 180$ ✓
 $2x + 100 = 180$
 $2x = 180 - 100$
 $2x = 80$
 $x = 40$ ✓

d $2x + 30 = x + 40$ ✓
 $2x - x = 40 - 30$
 $x = 10$ ✓

e $2x + 20 = 120$ ✓
 $2x = 120 - 20$
 $2x = 100$
 $x = 50$ ✓



$\therefore x = 90 - 54$ ✓
 $= 36$ ✓

(12 marks)

6 a $x = 360 - (90 + 90 + 135)$
 $= 360 - 315$
 $= 45$ ✓

b $x = 360 - (20 + 240 + 30)$
 $= 360 - 290$
 $= 70$ ✓

WORKED SOLUTIONS

CHECK YOUR SOLUTIONS



$$\begin{aligned} \text{c } x &= 360 - (60 + 125 + 135) \\ &= 360 - 320 \\ &= 40 \quad \checkmark \end{aligned}$$

$$\begin{aligned} \text{d } x &= 360 - [360 - (90 + 55 + 130)] \\ &= 90 + 55 + 130 \\ &= 275 \quad \checkmark \end{aligned}$$

e As $360 - 140 = 220$, then

$$2a + a + a + 220 = 360 \quad \checkmark$$

$$4a + 220 = 360$$

$$4a = 360 - 220$$

$$4a = 140$$

$$a = 35 \quad \checkmark$$

$$\text{f } 2y - 60 + 80 + 3y + 40 + y = 360 \quad \checkmark$$

$$6y + 60 = 360$$

$$6y = 360 - 60$$

$$6y = 300$$

$$y = 50 \quad \checkmark$$

(8 marks)

PROBABILITY

SKILLS CHECK

PAGE 69

$$1 \text{ a } Pr(3) = \frac{\text{no. favourable outcomes}}{\text{no. possible outcomes}} = \frac{1}{9}$$

$$\text{b } \text{There are 4 even-numbered balls, so } Pr(\text{even}) = \frac{4}{9}$$

$$\text{c } \text{There are 5 odd-numbered balls, so } Pr(\text{odd}) = \frac{5}{9}$$

$$\text{d } Pr(\text{not odd}) = 1 - Pr(\text{odd}) = 1 - \frac{5}{9} = \frac{4}{9}$$

$$\text{e } \text{Four of the balls have composite numbers (4, 6, 8 and 9; note that 1 is neither prime nor composite), so } Pr(\text{composite}) = \frac{4}{9}$$

$$\text{f } \text{Four of the balls have prime numbers (2, 3, 5 and 7), so } Pr(\text{prime}) = \frac{4}{9}$$

$$\text{g } \text{Balls 3, 6 and 9 are divisible by 3, so } Pr(\text{divisible by 3}) = \frac{3}{9} = \frac{1}{3}$$

$$\text{h } \text{The numbers 1, 3 and 5 are factors of 15, so } Pr(\text{factor of 15}) = \frac{3}{9} = \frac{1}{3}$$

$$\text{i } \text{There are 6 numbers less than 7, so } Pr(\text{less than 7}) = \frac{6}{9} = \frac{2}{3}$$

$$\text{j } \text{There are 5 numbers greater than 4, so } Pr(\text{greater than 4}) = \frac{5}{9}$$

$$\text{k } Pr(3 \text{ or } 5) = \frac{2}{9}$$

$$\text{l } \text{All of the numbers must be either even or odd, so } Pr(\text{even or odd}) = 1$$

$$2 \text{ a } Pr(6) = \frac{1}{6}$$

$$\text{b } Pr(\text{less than 4}) = \frac{3}{6} = \frac{1}{2}$$

$$\text{c } Pr(\text{not 3}) = 1 - \frac{1}{6} = \frac{5}{6}$$

$$\text{d } Pr(\text{not an odd number}) = 1 - \frac{3}{6} = \frac{1}{2}$$

$$\text{e } Pr(\text{square number}) = \frac{2}{6} = \frac{1}{3}$$

$$\text{f } Pr(\text{seven}) = 0$$

$$3 \text{ a } Pr(\text{red}) = \frac{4}{10} = \frac{2}{5}$$

$$\text{b } Pr(\text{white}) = \frac{3}{10}$$

$$\text{c } Pr(\text{white or green}) = \frac{5}{10} = \frac{1}{2}$$

$$\text{d } Pr(\text{not blue}) = 1 - \frac{1}{10} = \frac{9}{10}$$

$$\text{e } Pr(\text{black}) = 0$$

$$\text{f } Pr(\text{red, white or blue}) = \frac{8}{10} = \frac{4}{5}$$

$$4 \text{ } Pr(\text{red jelly bean}) = \frac{4}{7}$$

$$5 \text{ a } \text{There are 3 red sectors and 8 sectors in total, so } Pr(\text{red}) = \frac{3}{8}$$

$$\text{b } Pr(\text{green}) = \frac{1}{8}$$

$$\begin{aligned} \text{c } Pr(\text{not blue}) &= 1 - Pr(\text{blue}) \\ &= 1 - \frac{4}{8} = \frac{1}{2} \end{aligned}$$

$$\begin{aligned} 6 \text{ } &\text{If 5 red jelly babies remain, then a red was chosen (and eaten)} \\ &\therefore Pr(\text{red chosen}) = \frac{6}{12} = \frac{1}{2} \end{aligned}$$

$$\begin{aligned} 7 \text{ a } Pr(\text{male}) &= 1 - Pr(\text{female}) \\ &= 1 - 0.53 \\ &= 0.47 \end{aligned}$$

$$\therefore \text{probability of male is } 0.47$$

$$\begin{aligned} \text{b } \text{Number} &= 0.53 \times 1200 \\ &= 636 \\ &\therefore 636 \text{ females likely to be born} \end{aligned}$$

$$8 \text{ a } Pr(\text{watch TV}) = \frac{80}{360} = \frac{2}{9}$$

$$\begin{aligned} \text{b } \text{tidy room} &= 360^\circ - (120^\circ + 80^\circ + 90^\circ) \\ &= 360^\circ - 290^\circ \\ &= 70^\circ \end{aligned}$$

$$\begin{aligned} \therefore Pr(\text{not tidy}) &= 1 - Pr(\text{tidy}) \\ &= 1 - \frac{70}{360} \\ &= \frac{29}{36} \end{aligned}$$

WORKED SOLUTIONS



CHECK YOUR SOLUTIONS

PROBABILITY

INTERMEDIATE TEST PAGE 70

- 1 10 cards in total; 4 cards are blue.
 $\therefore Pr(\text{blue}) = \frac{4}{10}$
 $= \frac{2}{5}$ **B** ✓ (1 mark)
- 2 $Pr(\text{throwing a three}) = \frac{1}{6}$
 $\therefore Pr(\text{not a three}) = 1 - \frac{1}{6}$
 $= \frac{5}{6}$ **D** ✓ (1 mark)
- 3 11 cards in total; two cards have a 'B'.
 $\therefore Pr(B) = \frac{2}{11}$ **C** ✓ (1 mark)
- 4 52 cards; two are red 7s (the 7 of hearts and the 7 of diamonds).
 $\therefore Pr(\text{red } 7) = \frac{2}{52}$
 $= \frac{1}{26}$ **A** ✓ (1 mark)
- 5 Peter predicts either 41, 42, 43, 44 or 45.
 $\therefore Pr(\text{Peter correct}) = \frac{5}{45}$
 $= \frac{1}{9}$ **A** ✓ (1 mark)
- 6 a Total of eight balls.
 $\therefore Pr(\text{red}) = \frac{4}{8} = \frac{1}{2}$ ✓
 b $Pr(\text{white}) = \frac{2}{8}$
 $= \frac{1}{4}$ ✓
 c $Pr(\text{green}) = \frac{1}{4}$
 $\therefore Pr(\text{not green}) = 1 - \frac{1}{4}$
 $= \frac{3}{4}$ ✓ (3 marks)
- 7 a $Pr(\text{winning first prize}) = \frac{10}{100000}$
 $= \frac{1}{10000}$ ✓
 b After first prize is drawn, 99999 tickets remain—Sharon has 10. ✓
 $\therefore Pr(\text{winning second prize}) = \frac{10}{99999}$ ✓ (3 marks)

- 8 There are four faces with either a 2 or 3.

$$\therefore Pr(2 \text{ or } 3) = \frac{4}{6} \checkmark$$

$$= \frac{2}{3} \checkmark \quad (2 \text{ marks})$$

- 9 a $Pr(\text{Mitchell wins}) = \frac{1}{100} \checkmark$

- b There are two numbers that are one off Mitchell's ticket number. i.e. 13 and 15

$$\therefore Pr(13 \text{ or } 15) = \frac{2}{100}$$

$$= \frac{1}{50} \checkmark \quad (2 \text{ marks})$$

- 10 a There is one '\$50' on screen.

$$\therefore Pr(\$50) = \frac{1}{9} \checkmark$$

- b There are three '\$0's on screen.

$$\therefore Pr(\$0) = \frac{3}{9}$$

$$= \frac{1}{3} \checkmark$$

- c Could win \$50, \$80 or \$75.

$$\therefore Pr(\text{at least } \$50) = \frac{3}{9}$$

$$= \frac{1}{3} \checkmark \quad (3 \text{ marks})$$

PROBABILITY

ADVANCED TEST

PAGE 71

- 1 a $Pr(A) = \frac{1}{6} \checkmark$
 b $Pr(C) = \frac{2}{6} = \frac{1}{3} \checkmark$
 c $Pr(\text{vowel}) = \frac{2}{6} = \frac{1}{3} \checkmark$
 d $Pr(\text{consonant}) = \frac{4}{6} = \frac{2}{3} \checkmark$
 e $Pr(\text{not a consonant}) = 1 - \frac{2}{3} = \frac{1}{3} \checkmark \quad (5 \text{ marks})$

- 2 a

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

✓✓

- b 7 ✓

WORKED SOLUTIONS

CHECK YOUR SOLUTIONS



- c i $Pr(\text{odd}) = \frac{18}{36} = \frac{1}{2}$ ✓
 ii $Pr(< 7) = \frac{15}{36} = \frac{5}{12}$ ✓
 iii $Pr(\text{square}) = \frac{7}{36}$ ✓
 iv $Pr(\text{prime}) = \frac{15}{36} = \frac{5}{12}$ ✓
 v $Pr(\text{divisible by } 3) = \frac{12}{36} = \frac{1}{3}$ ✓
 vi $Pr(\text{multiple of } 4) = \frac{9}{36} = \frac{1}{4}$ ✓
 vii $Pr(\text{factor of } 12) = \frac{12}{36} = \frac{1}{3}$ ✓ (10 marks)

3 a $1 - \left(\frac{1}{2} + \frac{1}{3}\right) = 1 - \frac{3+2}{6}$
 $= 1 - \frac{5}{6}$
 $= \frac{1}{6}$
 Probabilities are $\frac{1}{2}, \frac{1}{3}, \frac{1}{6}$ ✓
 $\therefore$ smallest number of balls is 6 ✓

b i $Pr(1) = \frac{1}{6}$ ✓
 ii $Pr(\text{less than } 3) = 1 - Pr(3)$
 $= 1 - \frac{1}{3}$
 $= \frac{2}{3}$ ✓

iii $Pr(\text{odd}) = Pr(1 \text{ or } 3)$
 $= \frac{1}{6} + \frac{1}{3}$
 $= \frac{1+2}{6}$
 $= \frac{3}{6} = \frac{1}{2}$ ✓ (5 marks)

4 Sample space: 1, 2, 2, 4, 5, 6

a $Pr(2) = \frac{2}{6} = \frac{1}{3}$ ✓
 b $Pr(\text{even}) = \frac{4}{6} = \frac{2}{3}$ ✓
 c $Pr(< 3) = \frac{3}{6} = \frac{1}{2}$ ✓ (3 marks)

5 a $Pr(\text{red}) = 1 - (0.25 + 0.3 + 0.1)$
 $= 1 - 0.65$
 $= 0.35$ ✓

b blue: $0.25 \times 40 = 10$
 green: $0.3 \times 40 = 12$
 red: $0.35 \times 40 = 14$
 yellow: $0.1 \times 40 = 4$
 $\therefore$ 10 blue, 12 green, 14 red and 4 yellow ✓

- c $0.25 \times 10 = 2.5$. As it is impossible to have 2.5 balls, there cannot be 10 balls in the bag. ✓
 d The smallest number of balls is 20, which means 5 blue, 6 green, 7 red and 2 yellow ✓ (4 marks)

6 a

	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24
5	5	10	15	20	25	30
6	6	12	18	24	30	36

✓✓

b 6 and 12 ✓

c i $Pr(\text{even}) = \frac{27}{36} = \frac{3}{4}$ ✓
 ii $Pr(\text{composite}) = \frac{29}{36}$ ✓
 iii $Pr(\text{multiple of } 4) = \frac{15}{36} = \frac{5}{12}$ ✓
 iv $Pr(\text{factor of } 36) = \frac{20}{36} = \frac{5}{9}$ ✓
 v $Pr(\text{prime and odd}) = \frac{4}{36} = \frac{1}{9}$ ✓
 vi $Pr(\text{prime or odd}) = \frac{11}{36}$ ✓ (9 marks)

7 a

Let there be 1 green ball.
 This means 3 pink balls, 2 red balls and 6 orange balls.
 This means in a bag of 12 balls, there are 6 orange, 3 pink, 2 red and 1 green.

$\therefore Pr(\text{orange}) = \frac{6}{12} = \frac{1}{2}$

$Pr(\text{pink}) = \frac{3}{12} = \frac{1}{4}$

$Pr(\text{red}) = \frac{2}{12} = \frac{1}{6}$

$Pr(\text{green}) = \frac{1}{12}$ ✓✓

b The smallest possible number is 10. ✓

c As $\frac{1}{6} \times 72 = 12$, then there will be 12 red balls in the bag. ✓

d From part a there are now 3 pink balls, 6 orange balls and a green ball.

$Pr(\text{orange or green}) = \frac{7}{10}$ ✓ (5 marks)

WORKED SOLUTIONS

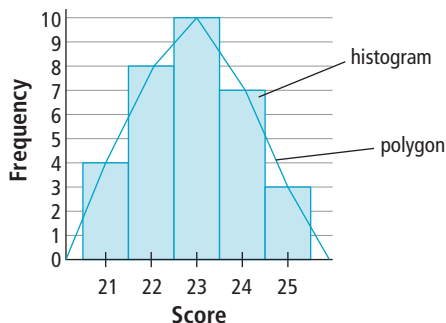
CHECK YOUR SOLUTIONS

DATA REPRESENTATION

SKILLS CHECK

PAGE 73

1



2

Class interval (kg)	Class centre (kg)	Tally	Frequency
46–50	48		4
51–55	53		8
56–60	58		4
61–65	63		10
66–70	68		3
71–75	73		1

3

Score	Frequency
71	3
72	5
73	7
74	6
75	1

4

Stem	Leaf
5	1 3 7 8
6	0 1 3 7 8 9 9
7	0 1 1 3 3 6 7 8 8 8 9 9
8	0 1 2 4 4 5 9
9	0 1

5

Class interval	Class centre	Frequency
20–29	24.5	5
30–39	34.5	7
40–49	44.5	7
50–59	54.5	5
60–69	64.5	6

DATA REPRESENTATION

INTERMEDIATE TEST

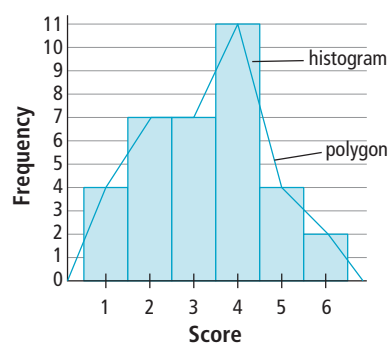
PAGE 74

1 a

Score	Frequency
1	4
2	7
3	7
4	11
5	4
6	2

✓✓✓

b



✓✓✓

c From table: $4 + 7 = 11$ ✓

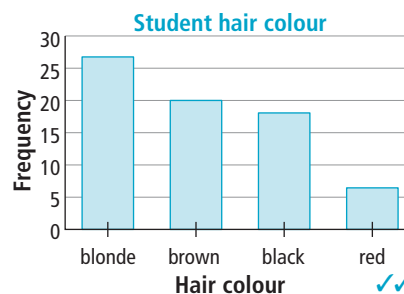
(7 marks)

2 a

Colour	Angle	Frequency
blonde	135°	27
brown	100°	20
black	90°	18
red	35°	7

✓✓

b



✓✓✓ (5 marks)

3 a The outlier is 12. ✓

b

Shoe size	Frequency
6	2
7	4
8	3
9	6
10	3
11	0
12	1

✓✓

WORKED SOLUTIONS

CHECK YOUR SOLUTIONS

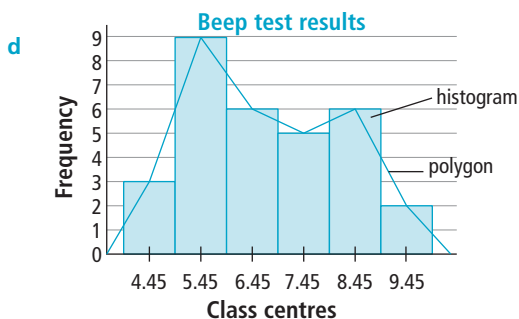
- c size 9 ✓
d $12 - 6 = 6$ ✓ (5 marks)

- 4 a 18 boys ✓
b 9.5 ✓

c

Class interval	Class centre	Frequency
4.0–4.9	4.45	3
5.0–5.9	5.45	9
6.0–6.9	6.45	6
7.0–7.9	7.45	5
8.0–8.9	8.45	6
9.0–9.9	9.45	2

✓✓✓



✓✓✓✓ (9 marks)

DATA REPRESENTATION

ADVANCED TEST

PAGE 75

- 1 a i Food amount = $\frac{2}{8} \times 1200$
 $= \frac{1}{4} \times 1200$
 $= 300$
 $\therefore$ \$300 spent on food ✓
 ii rent amount = $\frac{3}{18} \times \frac{1200^{150}}{1}$
 $= 450$
 $\therefore$ \$450 spent on rent ✓
 b i three-eighths = 360
 one-eighth = $360 \div 3$
 $= 120$
 $\therefore$ \$120 saved ✓

- ii five-eighths = 120×5
 $= 600$
 $\therefore$ \$600 spent on other activities ✓ (4 marks)

2

red	blue	green
-----	------	-------

✓✓ (2 marks)

3

Marks	Students
60–69	3
70–79	5
80–89	4
90–99	4

✓ (1 mark)

4 a

dogs	rabbits	cats	birds
------	---------	------	-------

- b Use the fact that there are 2 birds:

1 part = 2

3 parts = 6

$\therefore$ 6 rabbits ✓

c $\frac{4}{10} \times \frac{360}{1} = 144$

$\therefore$ an angle of 144° ✓

(3 marks)

5 a i $\frac{5}{10} \times \frac{100}{1} = 50$

$\therefore$ 50% of the time ✓

ii $\frac{3}{10} \times \frac{100}{1} = 30$

$\therefore$ 30% of the time ✓

b i $\frac{2}{10} \times \frac{60}{1} = 12$

$\therefore$ 12 minutes on bike ✓

ii $\frac{5}{10} \times \frac{60}{1} = 30$

$\therefore$ 30 minutes on treadmill ✓

c i 2 parts = 15

1 part = 7.5

5 parts = 7.5×2

$= 37.5$

$\therefore$ 37.5 minutes on treadmill ✓

ii 3 parts = 7.5×3

$= 22.5$

$\therefore$ 22.5 minutes on weights ✓ (6 marks)

6 a

NSW	SA	Victoria
-----	----	----------

✓✓

b i $\frac{1}{4} \times 36 = 9$

$\therefore$ 9 people born in NSW ✓

WORKED SOLUTIONS



CHECK YOUR SOLUTIONS

- ii Angle for Victoria = 240°

$$\frac{240}{360} \times \frac{36}{1} = 24$$

$\therefore$ 24 students born in Victoria ✓

- c i One-quarter = 18

$$\begin{aligned} \text{Four-quarters} &= 18 \times 4 \\ &= 72 \end{aligned}$$

$\therefore$ 72 students were involved in the survey ✓

ii $\frac{160}{360} \times \frac{72^{12}}{1} = 12$

$\therefore$ 12 students born in South Australia ✓

iii $\frac{240}{360} \times \frac{72^{24}}{1} = 48$

$\therefore$ 48 students born in Victoria ✓ (7 marks)

7	Girls		Boys
	9	3	
	9 6 5 2 0	4	2 2 6 6 7 9
	3 3 1	5	8 9
		6	1

✓✓
(2 marks)

DATA ANALYSIS

SKILLS CHECK

PAGE 77

- 1 a census b sample
c census d census

- 2 a No change = $34 + 26 = 60$ students

$$= \frac{60}{100} \times \frac{100}{1} \% = 60\%$$

- b 40 students ($20 + 20$) want to change

$$\% \text{ female} = \frac{20}{40} \times \frac{100}{1} \% = 50\%$$

- 3 a $\frac{4 + 7 + 8 + 4 + 2}{5} = \frac{25}{5} = 5$
 b $\frac{3 + 11 + 14 + 7 + 6 + 7}{6} = \frac{48}{6} = 8$
 c $\frac{0.4 + 2.56 + 3.84 + 4}{4} = \frac{10.8}{4} = 2.7$
 d $\frac{-4 + 7 + 6 + 8 + (-2)}{5} = \frac{15}{5} = 3$

- 4 a Sum of eight scores = $8 \times 6 = 48$
 $2 + 5 + 6 + 10 + 15 + 3 + x + 5 = 48$
 $x + 46 = 48$

$$\therefore x = 2$$

- b Sum of eight scores = 48
 $3 + y + 6 + 9 + 2 + (-1) + 4 + 8 = 48$
 $y + 31 = 48$

$$\therefore y = 17$$

- 5 Placing calculator in STAT mode:

a $\bar{x} = 5.13$ (2 decimal places)

b $\bar{x} = 14.64$ (2 decimal places)

- 6 Sum of five scores = $5 \times 10 = 50$

Sum of six scores = $6 \times 12 = 72$

$$\therefore \text{sixth score} = 72 - 50 = 22$$

$\therefore$ the new score is 22

- 7 a 6, 11, 14, 25, 35

$\therefore$ median is 14

- b 2, 41, 43, 44, 44, 56, 56, 58, 76, 98

$\therefore$ median is middle of 44 and 56

$\therefore$ median is 50

- 8 a Mode = 3

- b Mode = 9 and 12

- 9 a Range = $12 - 2 = 10$

b Range = $11 - (-15) = 11 + 15 = 26$

- 10 Group 1: 5, 5, 6, 7, 6, 7, 5, 7, 6, 6

Using calculator in STAT mode, $\bar{x} = 6$
 $\therefore$ mean = 6

To find median: 5, 5, 5, 6, 6, 6, 6, 7, 7

Both middle scores are 6

$\therefore$ median = 6

The number 6 occurs most often (4 times)

$\therefore$ mode = 6

Range = $7 - 5$

$\therefore$ range = 2

Group 2: 3, 9, 8, 7, 2, 4, 7, 5, 8, 7, 3

Using calculator in STAT mode, $\bar{x} = 6$
 $\therefore$ mean = 6

To find median: 2, 3, 4, 5, 7, 7, 7, 8, 8, 9

Both middle scores are 7

$\therefore$ median = 7

The number 7 occurs most often (3 times)

$\therefore$ mode = 7

Range = $9 - 2$

$\therefore$ range = 7

Therefore:

- a The mean of both groups is the same ($\bar{x} = 6$)

- b The median of Group 1 (6) is less than the median of Group 2 (7).

- c The mode of Group 1 (6) is less than the mode of Group 2 (7).

- d The range of Group 1 (2) is less than the range of Group 2 (7).

- 11 a Range = $9 - 2 = 7$

$\therefore$ scores are 2, 3, 5, 7, 8, 8, 9

The median is the same as the range

$\therefore x = 7$

WORKED SOLUTIONS

CHECK YOUR SOLUTIONS

$$\begin{aligned} \text{b Median} &= \frac{2+4}{2} = 3 \\ \text{Range} &= 3 \\ 5-x &= 3 \\ x &= 2 \end{aligned}$$

DATA ANALYSIS

INTERMEDIATE TEST PAGE 78

$$\begin{aligned} 1 \text{ Mean} &= \frac{4+7+2+8+6+4+3+0+1+5}{10} \\ &= \frac{40}{10} \\ &= 4 \end{aligned}$$

[use STAT mode on calculator] **B** ✓ (1 mark)

$$\begin{aligned} 2 \text{ For the median to be 6, the scores in order must be } &2, 4, x, 10. \\ \text{Now, the median (6) is middle of 4 and } x. & \\ \therefore x = 8 \text{ because the middle of 4 and 8 is 6} & \quad \text{C} \quad \checkmark \quad (1 \text{ mark}) \end{aligned}$$

$$\begin{aligned} 3 \text{ Mode is the most common score.} & \\ \text{i.e. the mode is 4} & \quad \text{C} \quad \checkmark \quad (1 \text{ mark}) \end{aligned}$$

$$\begin{aligned} 4 \text{ As the range is 10 and the lowest score is } -1, & \\ \text{the highest score is 9.} & \\ \therefore y = 9 & \quad \text{C} \quad \checkmark \quad (1 \text{ mark}) \end{aligned}$$

$$\begin{aligned} 5 \text{ Try each of the alternatives.} & \\ \text{Mode of English marks} &= 68 \\ \text{Mode of science marks} &= 79 \\ \therefore \text{mode of English marks is less than mode of} & \\ \text{science marks} & \quad \text{D} \quad \checkmark \quad (1 \text{ mark}) \end{aligned}$$

$$\begin{aligned} 6 \text{ a Mean} &= \frac{9+6+5+5+2+3+3}{7} \\ &= \frac{35}{7} \\ &= 5 \quad \checkmark \end{aligned}$$

[use STAT mode on calculator]

$$\begin{aligned} \text{b Scores: } 2, 3, 5, 5, 5, 6, 9 \\ \text{Median is } 5 \quad \checkmark \end{aligned}$$

$$\text{c Mode} = 5 \quad \checkmark$$

$$\begin{aligned} \text{d Range} &= 9-2 \\ &= 7 \quad \checkmark \quad (4 \text{ marks}) \end{aligned}$$

$$\begin{aligned} 7 \text{ a Mean} &= \frac{4+0+3+5+11+(-3)+6+3+5+9}{10} \\ &= \frac{43}{10} \\ &= 4.3 \quad \checkmark \end{aligned}$$

[use STAT mode on calculator]

$$\begin{aligned} \text{b Scores: } -3, 0, 3, 3, 4, 5, 5, 6, 9, 11 \\ \text{Median is the middle of 4 and 5.} \\ \therefore \text{median is } 4.5 \quad \checkmark \end{aligned}$$

$$\text{c Mode} = 3 \text{ and } 5 \quad \checkmark$$

$$\begin{aligned} \text{d Range} &= 11 - (-3) \\ &= 14 \quad \checkmark \quad (4 \text{ marks}) \end{aligned}$$

$$\begin{aligned} 8 \text{ Average of 4 tests} &= 76 \\ \text{Sum of 4 tests} &= 76 \times 4 \\ &= 304 \\ \text{Sum of 5 tests} &= 80 \times 5 \\ &= 400 \quad \checkmark \\ \text{Difference} &= 400 - 304 \\ &= 96 \\ \therefore \text{Jo must score 96 in her next test} & \quad \checkmark \quad (2 \text{ marks}) \end{aligned}$$

$$\begin{aligned} 9 \text{ Mean age} &= \frac{42+42+14+11+6}{5} \\ &= \frac{115}{5} \\ &= 23 \end{aligned}$$

[use STAT mode on calculator]

$$\begin{aligned} \therefore \text{mean age is } 23 \text{ years} & \quad \checkmark \\ \text{Mean height} &= \frac{176+172+165+158+145}{5} \\ &= \frac{816}{5} = 163.2 \end{aligned}$$

[use STAT mode on calculator]

$$\therefore \text{mean height is } 163.2 \text{ cm} \quad \checkmark \quad (2 \text{ marks})$$

$$\begin{aligned} 10 \text{ Location: the mean of the Tigers (166 cm) is lower} & \\ \text{than the Eagles' mean (167 cm). The median of the} & \\ \text{Tigers (165.5) is lower than the median for the Eagles} & \\ \text{(167 cm). The mode of the Tigers (163 cm) is lower} & \\ \text{than the mode of the Eagles (164 cm).} & \quad \checkmark \checkmark \checkmark \end{aligned}$$

$$\begin{aligned} \text{Spread: the range of the Tigers (12 cm) is less than} & \\ \text{the range of the Eagles (14 cm).} & \quad \checkmark \quad (4 \text{ marks}) \end{aligned}$$

DATA ANALYSIS

ADVANCED TEST PAGE 79

$$\begin{aligned} 1 \text{ Total mass} &= 52 \times 3 \\ &= 156 \quad \checkmark \\ \text{Len's mass} &= 156 - (48 + 50) \\ &= 156 - 98 \\ &= 58 \\ \therefore \text{Len has a mass of } 58 \text{ kg} & \quad \checkmark \quad (2 \text{ marks}) \end{aligned}$$

$$\begin{aligned} 2 \text{ Total for 6 months} & \\ &= 120\,000 \times 4 + 150\,000 + 180\,000 \\ &= 480\,000 + 330\,000 \\ &= 810\,000 \quad \checkmark \\ \text{Mean} &= 810\,000 \div 6 \\ &= 135\,000 \\ \therefore \text{the mean was } \$135\,000 & \quad \checkmark \quad (2 \text{ marks}) \end{aligned}$$

$$\begin{aligned} 3 \text{ The numbers could be } 3, 4, 8, 9; & \\ \text{or } 3, 5, 7, 9 & \quad \checkmark \quad (1 \text{ mark}) \end{aligned}$$

$$\begin{aligned} 4 \text{ The scores are } 4, 6, 7, 7 & \quad \checkmark \quad (1 \text{ mark}) \end{aligned}$$

WORKED SOLUTIONS



CHECK YOUR SOLUTIONS

- 5 a 4, 6, 6, 6, 8, 8, 12
 $\therefore$ the new score was 6 ✓
 b 4, 5, 6, 6, 8, 8, 12
 $\therefore$ the new score was 5 ✓
 c 4, 6, 6, 7, 8, 8, 12
 $\therefore$ the new score was 7 ✓
 d 0, 4, 6, 6, 8, 8, 12
 OR: 4, 6, 6, 8, 8, 12, 16
 $\therefore$ the new score was 0 or 16 ✓ (4 marks)

- 6 Sum of 5 scores = 9×5
 $= 45$ ✓
 Sum of 5 scores after change = 11×5
 $= 55$
 As $55 - 45 = 10$, then the score increased by 10 ✓ (2 marks)

- 7 0, 2, 2, 2, 4, 4
 a mode unchanged ✓
 b median unchanged ✓
 c range increases ✓
 d mean decreases ✓ (4 marks)

- 8 a 4, 6, 6, 9, 10 ✓
 b 1, 2, 6, 6, 10 ✓ (2 marks)

- 9 Total in 4 games = 3×4
 $= 12$
 Total in 5 games = 4×5
 $= 20$ ✓
 Increase = $20 - 12$
 $= 8$
 The score in the fifth game was 8:3. ✓ (2 marks)

- 10 a i Mean = $\frac{0.4 + 0.04 + 0.4 + 0.04 + 4 + 0.4}{6}$

$$= \frac{5.28}{6}$$

$$= 0.88$$
 ✓

ii mode = 0.4 ✓

iii 0.04, 0.04, 0.4, 0.4, 0.4, 4
 $\therefore$ median is 0.4 ✓

iv range = $4 - 0.04$
 $= 3.96$ ✓

b i Mean = $\left(\frac{1}{4} + \frac{1}{2} + \frac{3}{4} + \frac{1}{3} + \frac{1}{4}\right) \div 5$
 $= \frac{3 + 6 + 9 + 4 + 3}{12} \div 5$
 $= \frac{25}{12} \times \frac{1}{5}$
 $= \frac{5}{12}$ ✓
 ii mode = $\frac{1}{4}$ ✓

iii $\frac{1}{4}, \frac{1}{4}, \frac{1}{3}, \frac{1}{2}, \frac{3}{4}$
 $\therefore$ median is $\frac{1}{3}$ ✓

iv range = $\frac{3}{4} - \frac{1}{4}$
 $= \frac{2}{4}$
 $= \frac{1}{2}$ ✓

c i Mean = $\frac{4 - 3 + 2 - 1 - 1 + 1 - 2}{7}$
 $= 0$ ✓

ii mode = -1 ✓

iii -3, -2, -1, -1, 1, 2, 4
 $\therefore$ median is -1 ✓

iv range = $4 - -3$
 $= 7$ ✓

(12 marks)

- 11 Mean of 4 scores = 8
 Total of 4 scores = 8×4
 $= 32$ ✓

Let the new score = x
 Mean of 6 scores = 12
 Total of 6 scores = 12×6
 $= 72$
 $\therefore 32 + 12 + x = 72$
 $x + 44 = 72$
 $x = 72 - 44$
 $= 28$

$\therefore$ the other new score is 28 ✓ (2 marks)

- 12 One new score is less than the median and the other is more than the median. This means the median remains at 6. ✓ (1 mark)

- 13 Mean of 10 scores = 4
 Total of 10 scores = 4×10
 $= 40$ ✓

Mean of 12 scores = 8
 Total of 12 scores = 8×12
 $= 96$

Sum of 2 new scores = $96 - 40$
 $= 56$

Mean of 2 new scores = $56 \div 2$
 $= 28$

$\therefore$ the mean of the two scores is 28 ✓ (2 marks)

- 14 If the mean did not change then the mean height of Joshua and Mia is 140.

Total of Joshua and Mia = 140×2
 $= 280$ ✓
 Height of Mia = $280 - 143$
 $= 137$

$\therefore$ Mia has a height of 137 cm ✓ (2 marks)

WORKED SOLUTIONS

CHECK YOUR SOLUTIONS



INTERPRETING DATA FROM GRAPHS

SKILLS CHECK

PAGE 81

1 a Maths quiz results

Score (x)	Frequency (f)	fx
13	1	13
14	1	14
15	2	30
16	5	80
17	7	119
18	6	108
19	5	95
Totals	$\Sigma f = 27$	$\Sigma fx = 459$

b i Mean = $\frac{459}{27} \therefore 17$

ii Median = 14th score $\therefore 17$

iii Mode = 17

iv Range = $19 - 13 \therefore 6$

c There are $(5 + 2 + 1 + 1)$ results less than 17.
 $\frac{9}{27} = \frac{1}{3} \therefore \frac{1}{3}$ of results are less than 17

d There are $(6 + 5)$ results greater than 17.
 $\therefore$ probability is $\frac{11}{27}$

2 a

Score (x)	Frequency (f)	fx
3	7	21
5	7	35
7	12	84
10	4	40
Totals	$\Sigma f = 30$	$\Sigma fx = 180$

b i Mean = $\frac{180}{30} \therefore 6$

ii Median = average of 15th and 16th scores. The 15th and 16th scores are both 7. $\therefore 7$

iii Mode = 7

iv Range = $10 - 3 \therefore 7$

c There are $(7 + 7)$ scores less than 7. $\therefore 14$

d Mean is 6. There are $(12 + 4)$ scores greater than 6.

Probability = $\frac{16}{30} = \frac{8}{15}$

$\therefore$ probability is $\frac{8}{15}$

15 Mean of 4 tests = 70

Total for 4 tests = 70×4

= 280 ✓

Mean of 5 tests = 75

Total of 5 tests = 75×5

= 375

Result in 5th test = $375 - 280$

= 95

$\therefore$ Sheridan needs to score 95% ✓

(2 marks)

16 a Mean of 6 scores = 5

Total of scores = 6×5

= 30 ✓

$\therefore 1 + 3 + 4 + x + 8 + 8 = 30$

$x + 24 = 30$

$x = 30 - 24$

$x = 6$ ✓

b median is 6:

$\therefore$ middle of 4 and x is 6.

$\therefore x = 8$ ✓

(3 marks)

17 Mean temp. of 5 mornings = -3

Sum temp. of 5 mornings = -3×5

= -15 ✓

Mean temp. of 6 mornings = -2

Sum temp. of 6 mornings = -2×6

= -12

Difference = $-12 - (-15)$

= $-12 + 15$

= 3

$\therefore$ the temperature on sixth morning was 3° ✓

(2 marks)

18 If median is 3 then scores are $x, 3, 4$.

If range is 3 then scores are 1, 3, 4. ✓

This means the missing scores are 1 and 3. ✓ (2 marks)

19 Mean age of boys = 10

Total age of boys = 12×4

= 48

Mean age of girls = 6

Total age of girls = 6×2

= 12 ✓

Total age of children = 60

Mean age of children = $60 \div 6$

= 10

$\therefore$ the mean age is 10 ✓

(2 marks)

WORKED SOLUTIONS



CHECK YOUR SOLUTIONS

3 a i Mean = $\frac{\text{number of cars}}{\text{number of families}}$

$$= \frac{(1 \times 4) + (2 \times 7) + (3 \times 5) + (4 \times 3) + (5 \times 1)}{4 + 7 + 5 + 3 + 1}$$

$$= \frac{50}{20} = 2.5 \quad \therefore \text{mean is } 2.5$$

ii There are 20 scores, so the median will be the average of the 10th and 11th scores. The 10th and 11th scores are both 2. $\therefore$ median = 2

iii Mode = 2

iv Range = $5 - 1$ $\therefore$ range is 4

b 5 families own 3 cars and there are 20 families in total, so $= \frac{5}{20} = \frac{1}{4}$

$\therefore$ probability is $\frac{1}{4}$

4 a i Mean = $\frac{(148 \times 2) + (149 \times 4) + (150 \times 6) + (151 \times 5) + (152 \times 3)}{2 + 4 + 6 + 5 + 3}$

$$= \frac{3003}{20} = 150.15 \quad \therefore \text{mean is } 150.15$$

ii There are 20 scores, so the median will be the average of the 10th and 11th scores. The 10th and 11th scores are both 150. $\therefore$ median = 150

iii Mode = 150

iv Range = $152 - 148$ $\therefore$ range is 4

b 6 packets contain less than 150,

so $= \frac{6}{20} \times \frac{100}{1} \% = 30\%$

$\therefore$ 30% of packets

5 a i Mean = 70.4 [using STAT mode on calculator]

ii Median = 8th score $\therefore$ median = 72

iii Mode = 78

iv Range = $89 - 50$ $\therefore$ range is 39

b Mean is 70.4, so seven scores are less than the mean. There are 15 scores in total.

so $= \frac{7}{15} \times \frac{100}{1} \% = 46.666666\%$

$\therefore$ 46.7%

INTERPRETING DATA FROM GRAPHS

INTERMEDIATE TEST PAGE 82

1 Median, the middle score, is 33. As range is 33 and the lowest score is 12, then highest score = $33 + 12 = 45$

$\therefore$ missing digit is 5 **A** ✓

(1 mark)

Score (x)	Frequency (f)	fx
2	5	10
4	8	32
5	9	45
7	3	21
Totals	$\Sigma f = 25$	$\Sigma fx = 108$

By completing the table, the value of y is 45. **D** ✓ (1 mark)

Score	Frequency
x	5
y	8

The median is 6 so $y = 6$.

As range is 4, then $x = 2$ **B** ✓ (1 mark)

Score (x)	Frequency (f)	fx
21	3	63
22	5	110
23	7	161
24	6	144
25	4	100
Totals	$\Sigma f = 25$	$\Sigma fx = 578$

a Mean = $\frac{\Sigma fx}{\Sigma f}$ ✓

$$= \frac{578}{25}$$

$$= 23.12$$
 ✓

b Mode = 23 ✓

c Median: as there are 25 scores we look for the 13th score ($\frac{25+1}{2}$ -th score)

i.e. 13th score is 23

$\therefore$ median is 23 ✓

d Range = $25 - 21$
 $= 4$ ✓

(5 marks)

WORKED SOLUTIONS

CHECK YOUR SOLUTIONS



Score (x)	Frequency (f)	fx
1	3	3
2	4	8
3	2	6
4	4	16
5	2	10
Totals	$\Sigma f = 15$	$\Sigma fx = 43$

a i Mean = $\frac{\Sigma fx}{\Sigma f}$ ✓
 $= \frac{43}{15}$
 $= 2.8\bar{6}$

$\therefore$ mean = 2.9 ✓

ii Median: as there are 15 scores, the median is the $\frac{15+1}{2}$ th score—i.e. the 8th score.

Working down the frequency column, the 8th score is 3.

$\therefore$ median is 3 ✓

iii Mode = 2 and 4 ✓
 [2 and 4 occur most frequently]

iv Range = 5 - 1 = 4
 $\therefore$ range is 4 ✓

b As there are 3 families with one mobile phone,

$Pr(\text{one phone}) = \frac{3}{15} = \frac{1}{5}$

$\therefore$ Probability = $\frac{1}{5}$ ✓

(6 marks)

INTERPRETING DATA FROM GRAPHS

ADVANCED TEST

PAGE 83

1 Mode = 70 ✓
 range = 91 - 50
 $= 41$ ✓
 median = 70 ✓

(3 marks)

2 Mode = 10 ✓
 range = 10 - 6
 $= 4$ ✓
 median = 9 ✓

(3 marks)

3 Mode = 6 ✓
 range = 8 - 2
 $= 6$ ✓
 median = 6 ✓

mean

$= \frac{2 \times 3 + 3 + 4 + 5 + 6 \times 4 + 7 + 8 \times 2}{13}$

$= \frac{65}{13}$

$= 5$ ✓

(4 marks)

4 a Mode = 154 ✓
 range = 165 - 143
 $= 22$ ✓

median = 152 ✓

b Mode = 150 ✓
 range = 161 - 133
 $= 28$ ✓

median = 149 ✓

c Mode = 150 and 154 ✓
 range = 165 - 133
 $= 32$ ✓

median = 150 ✓

d $Pr(150 \text{ cm}) = \frac{4}{25}$ ✓

(10 marks)

5 a $x < 3$ ✓

b $x > 5$ ✓

c If mean is 4.7, then the frequency of 5 would be less than 5. Try $x = 3$:

Score	Frequency	Score $\times$ Freq
4	5	20
5	3	15
6	2	12
Total	10	47

$\therefore$ mean = $47 \div 10$

$= 4.7$

$\therefore x = 3$ ✓

(3 marks)

6 a As $69 - 37 = 32$, then the value of a is 2. ✓

b Median of 50.5 is halfway between unknown and 52. This means the unknown must be 49.

$\therefore$ the value of b is 9. ✓

(2 marks)

7 a Total students = $3 + 5 + 5 + 5 + 6 + 3$
 $= 27$ ✓

b Total girls = $2 + 3 + 2 + 3 + 2 + 1$
 $= 13$ ✓

c 2 boys have 5 mobiles in their homes ✓

d Total mobiles
 $= 3 \times 0 + 5 \times 1 + 5 \times 2 + 5 \times 3 + 6 \times 4 + 3 \times 5$ ✓
 $= 0 + 5 + 10 + 15 + 24 + 15$
 $= 69$ ✓

e i 4 ✓

ii 1 and 3 ✓

WORKED SOLUTIONS



CHECK YOUR SOLUTIONS

- f i** For the group:

x	f	fx
0	3	0
1	5	5
2	5	10
3	5	15
4	6	24
5	3	15
Total	27	69

median is 3 ✓

- ii** For the girls:

x	f	fx
0	2	0
1	3	3
2	2	4
3	3	9
4	2	8
5	1	5
Total	13	29

median is 2 ✓

g i Mean for group = $\frac{69}{27}$
 $= 2\frac{5}{9}$ ✓

ii Mean for girls = $\frac{29}{13}$
 $= 2\frac{3}{13}$ ✓

(11 marks)