S2 Final Assessment Revision Booklet B MP1/2

Contents

Algebra
Speed Distance Time
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Algebra- Factorise

Q1. Factorise by finding the common factor

a.	$2x + 4$	b.	$3d + 9$	c.	$6s + 3$	d.	$12x + 4$
e.	$6 + 9a$	f.	$2b + 8$	g.	$5y + 10$	h.	$10 + 15c$
i.	$12x + 16$	j.	$18m + 24$	k.	$30 + 36a$	l.	$14y + 21$

Q2. Factorise by finding the common factor

a.	$3x - 6$	b.	$4y - 8$	c.	$16 - 8a$	d.	$10c - 15$
e.	$9s - 12$	f.	$2b - 14$	g.	$12x - 20$	h.	$22m - 33$
i.	$15x - 10$	j.	$18 - 12y$	k.	$25b - 20$	l.	$18d - 30$

Q3. Factorise by finding the common factor

a.	$2a + 4b$	b.	$10x - 12y$	c.	$18m + 24n$	d.	$10c + 15d$
e.	$6a - 9x$	f.	$18s - 12t$	g.	$12x + 15y$	h.	$14a - 7b$
i.	$25c + 10d$	j.	$9b - 15y$	k.	$18x + 24y$	l.	$6a + 28b$

Q4. Factorise by finding the common factor

a.	$ax + ay$	b.	$xy^2 + xa^2$	c.	$pqr + pst$
d.	$xay - bac$	e.	$pq + p$	f.	$y^2 + y$
g.	$a^2 - ab$	h.	$ab - bc$	i.	$n^2 - 3n$
j.	$xy + y^2$	k.	$abc - abd$	l.	$fgh - efg$

Q5. Factorise by finding the highest common factor

a.	$2ax + 6a$	b.	$3y + 9y^2$	c.	$24a - 16ab$
d.	$pq^2 - pq$	e.	$12xy - 9xz$	f.	$6b^2 - 4b$
g.	$3a^2 + 27ah$	h.	$15abc + 20abd$	i.	$3s^3 - 9s^2$
j.	$14x - 12xyz$	k.	$10b^2c - 15bcd$	l.	$2\pi r^2 + 2\pi rh$

Q6. Factorise

a.	$ap + aq - ar$	b.	$2a + 2b + 2c$	c.	$6e - 2f + 4g$
d.	$p^2 + pq + xp$	e.	$3ab - 6bc - 9bd$	f.	$\frac{1}{2}ah + \frac{1}{2}bh + \frac{1}{2}ch$
g.	$5x^2 - 8xy + 5x$	h.	$4ac + 6ad - 10a^2$	i.	$15p^2 + 10pq + 20ps$

Q7. Factorise

a.	$ab^2c - a^2bd$	b.	$a^3 - a^2 - a$	c.	$2x^2 - 50x + 12xy$
d.	$x^6 + x^4 + x^2$	e.	$25p^2 + 15pq + 10p$	f.	$x^2yz + axy + bxy^2$
g.	$3a^4 + 9a^3 - 6a$	h.	$abx + bcx - bcy$	i.	$\frac{1}{2}gtT - \frac{1}{2}gt^2$

Algebra- Factorise

Q1.
a. $2(x + 2)$ b. $3(d + 3)$ c. $3(2s + 1)$ d. $4(3x + 1)$
e. $3(2 + 3a)$ f. $2(b + 4)$ g. $5(y + 2)$ h. $5(2 + 3c)$
i. $4(3x + 4)$ j. $6(3m + 4)$ k. $6(5 + 6a)$ l. $7(2y + 3)$

Q2.
a. $3(x - 2)$ b. $4(y - 2)$ c. $8(2 - a)$ d. $5(2c - 3)$
e. $3(3s - 4)$ f. $2(b - 7)$ g. $4(3x - 5)$ h. $11(2m - 3)$
i. $5(3x - 2)$ j. $6(3 - 2y)$ k. $5(5b - 4)$ l. $6(3d - 5)$

Q3.
a. $2(a + 2b)$ b. $2(5x + 6y)$ c. $6(3m + 4n)$ d. $5(2c + 3d)$
e. $3(2a - 3x)$ f. $6(3s - 2t)$ g. $3(4x + 5y)$ h. $7(2a - b)$
i. $5(5c + 2d)$ j. $3(3b - 5y)$ k. $6(3x + 4y)$ l. $2(3a + 14b)$

Q4.
a. $a(x + y)$ b. $x(y^2 + a^2)$ c. $p(qr + st)$ d. $a(xy - bc)$
e. $p(q + 1)$ f. $y(y + 1)$ g. $a(a - b)$ h. $b(a - c)$
i. $n(n - 3)$ j. $y(x + y)$ k. $ab(c - d)$ l. $fg(h - e)$

Q5.
a. $2a(a + 3)$ b. $3y(1 + 3y)$ c. $8a(3 - 2b)$ d. $pq(q - 1)$
e. $3x(4y - 3z)$ f. $2b(3b - 2)$ g. $3a(a + 9h)$ h. $5ab(3c + 4d)$
i. $3s^2(s - 3)$ j. $2x(7 - 6yz)$ k. $5bc(2b - 3d)$ l. $2\pi r(r + h)$

Q6.
a. $a(p + q + r)$ b. $2(a + b + c)$ c. $2(3e - f + 2g)$
d. $p(p + q + x)$ e. $3b(a - 2c - 3d)$ f. $\frac{1}{2}h(a + b + c)$
g. $x(5x - 8y + 5)$ h. $2a(2c + 3d - 5a)$ i. $5p(3p + 2q + 4s)$

Q7.
a. $ab(bc - ad)$ b. $a(a^2 - a - 1)$ c. $2x(x - 25 + 6y)$
d. $x^2(x^4 + x^2 + 1)$ e. $5p(5p + 3q + 2)$ f. $xy(xz + a + by)$
g. $3a(a^3 + 3a^2 - 2)$ h. $b(ax + cx - cy)$ i. $\frac{1}{2}gt(T - t)$

Algebra

1. Copy and complete :-

   (You may have been shown a different method)

   a

   $$8x + 1 = 6x + 17$$
   $$\Rightarrow 2x + 1 = ...$$
   $$\Rightarrow 2x = ...$$
   $$\Rightarrow x = ...$$

   b

   $$7x - 3 = x + 15$$
   $$\Rightarrow 7x - ... = ...$$
   $$\Rightarrow 7x = ...$$
   $$\Rightarrow x = ...$$

2. Solve these equations :-

   a $5x + 4 = 2x + 19$

   b $3x + 7 = x + 11$

   c $8x + 6 = 7x + 22$

   d $4x - 5 = x + 16$

   e $11x - 1 = 2x + 17$

   f $6x - 4 = 4x + 23.$

3. These equations are a little "different". Solve :-

   a $5x = 4x + 3$

   b $3x = x + 44$

   c $7x = 4x + 42$

   d $12x = 8x + 1$

   e $15x = 3x + 18$

   f $6x - 2 = 8x.$

4. Joe bought 5 bags of marbles. Harry bought 3 bags, but he already had 20 loose marbles. They then had exactly the same number of marbles.

   a   Make up an equation to show this information.

   b   Solve the equation to determine how many marbles there are in a bag.

Algebra

Solving Equations with Brackets

1. Solve these equations by multiplying out the brackets first :-

   a $3(x + 4) = 21$ b $5(x + 2) = 80$ c $4(x - 3) = 28$

   d $9(x + 2) = 63$ e $8(x + 7) = 72$ f $3(x + 3) = 0$.

2. Solve these equations :-

   a $2(4x + 2) = 20$ b $3(2x - 1) = 21$ c $4(4x - 5) = 28$

   d $6(2x - 1) = 10x$ e $10(3x - 3) = 11x + 8$ f $7(x + 9) = 6x$.

3. Solve :-

   a $2(x + 4) - x - 6 = 7$ b $3(x + 1) + 3x - 8 = 13$

   c $4(x + 2) - 3x = 14$ d $8(x - 2) + 2x + 6 = 10$

   e $3(3x + 2) + 4(x - 1) = 6x + 9$ f $2(5x - 4) + 6(x + 1) = 3x + 24$

   g $3(x + 7) - 4(x + 3) = 10$ h $2(x - 3) - 3(x - 4) = 7$

   i $3(3x + 1) - 2(x - 5) = x + 37$ j $13(x + 3) - 2(3x + 11) = 2x + 7$.

Solving Equations with Fractions

1. Copy and complete the following equation :-

   $$\tfrac{1}{2}x + 4 = 11$$

   $$2 \times \tfrac{1}{2}x + 2 \times 4 = 2 \times 11$$

   $$\Rightarrow \quad x + \ldots = \ldots$$

   $$\Rightarrow \quad\quad x = \ldots$$

2. Solve each of these equations, by first of all multiplying every term by the l.c.m. of all the fractional denominators. This should eliminate all the fractions.

   a $\tfrac{1}{2}x - 2 = 5$ b $\tfrac{1}{3}x + 1 = 11$ c $\tfrac{1}{4}x - 5 = 3$

   d $\tfrac{3}{4}x - 12 = 0$ e $2 + \tfrac{1}{3}x = 13$ f $\tfrac{3}{8}x + 8 = 14$

   g $\tfrac{2}{3}x + 5 = 15$ h $\tfrac{5}{6}x - 8 = 12$ i $\tfrac{3}{6}x + \tfrac{1}{6} = \tfrac{4}{6}$

   j $\tfrac{2}{3}x + \tfrac{1}{2} = 2\tfrac{1}{2}$ k $\tfrac{1}{2}x + \tfrac{1}{3} = \tfrac{2}{3}$ l $\tfrac{1}{4}x + \tfrac{2}{3} = \tfrac{5}{3}$

   m $\tfrac{1}{2}x - 4 = \tfrac{3}{4}$ n $\tfrac{2}{3}x - 10 = \tfrac{1}{3}$ o $\tfrac{1}{2}x + \tfrac{2}{3} = \tfrac{3}{4}$.

Answers

Ch 5   Ex 2   **Harder Equations**

1. a 8   b 3
2. a 5   b 2   c 16
    d 7   e 2   f $27/2$
3. a 3   b 22   c 14
    d $1/4$ e $18/12 = 1.5$ f -1
4. a $5x = 3x + 20$ b 10

Ch 5   Ex 3   **Solving Equations with Brackets**

1. a 3   b 14   c 10
    d 5   e 2   f -3
2. a 2   b 4   c 3
    d 3   e 2   f -63
3. a 5   b 3   c 6
    d 2   e 1   f 2
    g -1   h -1   i 4
    j -2

Ch 5   Ex 4   **Solving Equations with Fractions**

1. 14
2. a 14   b 30   c 32
    d 16   e 33   f 16
    g 15   h 24   i 1
    j 3   k $2/3$ l 4
    m $9\frac{1}{2}$ n $15\frac{1}{2}$ o $1/6$

Speed Distance Time

Time, Distance & Speed

1. Find the unknown quantity in each of the following :-

   a   Distance = ? km   Speed = 20 km/hr   Time : 3 hours.

   b   Distance = 90 miles   Speed = ? mph   Time : 1 hours.

   c   Distance = 100 km   Speed = 40 km/hr   Time : ? hours.

   d   Speed = 24 m/sec   Time = ? secs   Distance = 288 m.

2. a   A tortoise walks at 2 metres per minute.
       How long will it take to walk 9 metres ?

   b   Addison runs at 4 metres per second.
       How far will he travel in ten and a half seconds ?

   c   A bus journey, 60 kilometres long, takes one and a half hours.
       How fast is the bus travelling ?
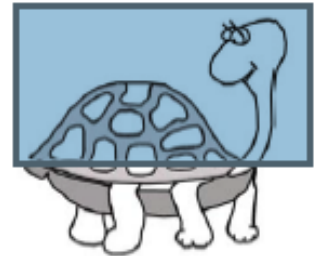
3. A jet has a 200 mile journey to complete.
   How long would it take at a speed of :-

   a   100 mph   b   400 mph

4. Jane ran round a 1500 metre track and took 6 minutes.

   a   At what speed in metres per minute was Jane running ?

   b   Bob beat Jane's time by a minute.
       What was Bob's speed ?

5. Ryan cycled from home to school (8 km) at a speed of 16 km/hr.
   He had to walk home from school due to a puncture.
   If Ryan walked at a speed of 6 km/hr, how much quicker was he cycling than walking ?

Speed Distance Time

Problems involving half/quarter hours

1. Find the unknown quantity in each of the following :-

   a   Distance =   ? km   Speed = 40 km/hr   Time : $2\frac{1}{2}$ hours.

   b   Distance = 900 miles   Speed = ? mph   Time : $1\frac{1}{2}$ hours.

   c   Distance = 210 km   Speed = 60 km/hr   Time : ? hours.

   d   Speed = 240 km/hr   Time = 3 hrs 30 mins   Distance = ?

   e   Speed = 100 m/min   Time = $2\frac{1}{4}$ mins   Distance = ?

   f   Speed = 72 km/hr   Distance = 18 km   Time = ?

2. a   A jogger took 1 hour and 15 minutes to cover 11·25 km.
       What was the average speed in km/hr ?

   b   A boat takes 6 hours and 45 minutes at an average
       speed of 20 km/hr to travel from Port A to Port B.
       What far is it from Port A to Port B ?

3. A train leaves Ayton at 1500 hours and
   travels to Beeton 75 km away at 30 km/hr.
   The train is due to arrive at Beeton at 1720.
   Will it arrive on time ?

Exercise 3   Converting hrs & mins to Decimal Times

1. Change the following to decimals of an hour :-

   a   45 minutes   b   24 minutes   c   36 minutes   d   27 minutes.

2. Change the following to decimals of a hour. Give your answer to two decimal places :-

   a   7 minutes   b   40 minutes   c   8 minutes   d   124 minutes.

3. Change each time to decimal form :-

   a   2 hrs 33 mins   b   1 hr 48 mins   c   5 hrs 6 mins   d   3 hrs 3 mins.

Speed Distance Time

4. Calculate the unknown quantity in each of the following :-

    a   Distance = ? km   Speed = 80 km/hr   Time : 2 hrs 45 mins.

    b   Distance = 64 miles   Speed = ? mph   Time : 1 hr 36 mins.

    c   Distance = 420 km   Speed = 50 km/hr   Time : ? hrs ? mins .

5. The distance between two towns Hurley and Burley is 48 kilometres.
    Gerry drives a truck from Hurley to Burley at a speed of 30 km/hr.
    On the return trip he increases his speed by 6 km/hr.

    How much faster, in minutes and seconds, was the return trip ?

Exercise 4   **Converting Decimal Times to Hrs & Mins**

1. Change the calculator displays (shown in hours) to hours and minutes :-

    a $2 \cdot 8$ b $4 \cdot 4$ c $0 \cdot 35$

2. Change each of the following to hours and minutes :-

    a   4·6 hours   b   8·15 hours   c   3·05 hours   d   1·125 hours.

3. Calculate the time taken in hours and minutes for the following journeys :-

    a   A rally car travelling 150 kilometres at 40 km/hr.

    b   A marathon runner (26 miles) at a speed of 12 mph.

    c   A speed boat at 40 km/hr travelling 36 kilometres.

4. Change each of the following speeds to km/hr :-

    a   20 m/sec   b   250 m/sec   c   10·5 m/sec   d   50 cm/min.

5. In a Marathon race, Dale had a finishing time of 3 hours and 25 mins.

    Alice had a finishing time of 3·4 hours.

    Una completed her race in $3\frac{3}{8}$ hours.

    a   Between these three people, who came :-

        (i)   first   (ii) last ?

    b   What was the time difference between :-
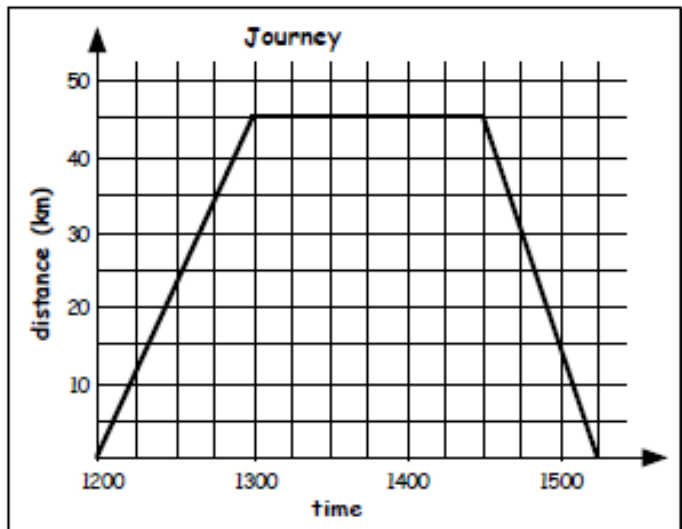
   (i) first and second   (ii) first and last ?

Speed Distance Time

1. The distance-time graph shows
    the journey Maggie made from
    her house to her favourite
    clothes shop and home again.

    a How long did the drive to
    the shop take ?

    b How far away is the shop
    from her house ?

    c How long did she stay at
    the shop ?

    d Calculate Maggie's speed :–

    (i) going to the shop.

    (ii) on the journey home.

2. On Saturday, Mr Jenkins and Mrs Jenkins both leave from home and drive to Airdrie.
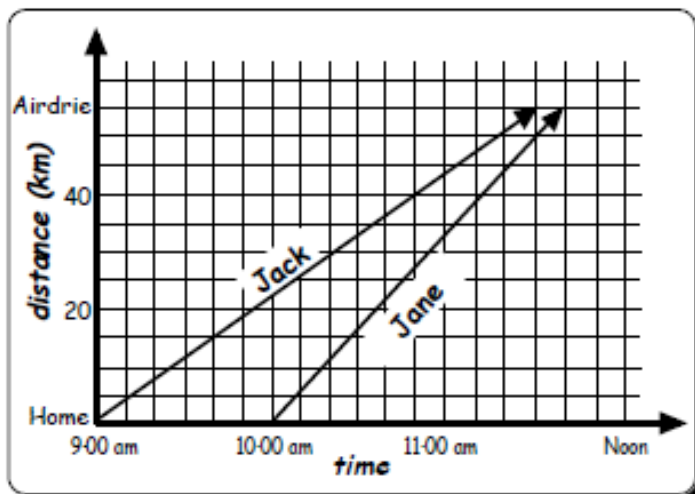
    a At what time did each of the Jenkins leave their house ?

    b How far away is Airdrie from their house ?

    c Who arrived in Airdrie first and by how many minutes ?

    d Calculate the average speed of both.

    e (**Difficult**). Mr Jenkins left Airdrie at Noon and drove home at 25 km/hr.
        Mrs Jenkins drove home at 30 km/hr.

        If they both arrived home at the same time, when must
        Mrs Jenkins have left Airdrie (to the nearest minute) ?

Speed Distance Time

3. Billy set off at 11·00 am on Sunday and travelled 50 miles to Edinburgh at an average speed of 40 mph. He shopped for 45 minutes in Edinburgh, then drove home at an average speed of 50 mph.

   Show Billy's journey on a Distance - Time graph.

4. Alan left home at ten past nine, driving at a speed of 60 km/hr, but found he had a puncture after just 20 km. It took him 40 minutes to get the puncture repaired and he then drove straight back home at 50 km/hr.

   Show this journey on a Distance - Time graph.

Revisit - Review - Revise Exercise 15

1. Choose the appropriate formula and show all working in each of the following :-

   a Pauline drove 300 kilometres at 60 km/hr. How long did she take ?

   b Arnie flew at 120 mph for 4 hours. How far had Arnie flown ?

   c Kevin took 4 hours to cycle 60 kilometres. How fast was he cycling ?

2. Change each of the following times to decimals :-

   a 48 mins   b 3 hrs 12 mins   c 1 hr 42 mins.

3. Change each time to hours and minutes :-

   a 2·25 hours   b 0·45 hours   c 5·05 hours.

4. a Fred takes three quarters of an hour to drive 42 km to work.
      What is Fred's average speed ?

   b Jeri drives at 80 km/hr and takes 1 hour and 12 minutes to get to work.
      How far does Jeri drive to work ?

   c Terry the tortoise takes 40 minutes to crawl 16 metres.
      Sally Slug slithers 900 centimetres in 30 minutes.
      How much faster is Terry than Sally ?

5. Last Sunday, Chelsea left home at Noon and cycled 20 kilometres to her office.
   She arrived at 1·20 pm and spent 10 minutes collecting the papers she had forgotten.
   She then cycled home and arrived at 2.30 pm.

   a Show all the given information on a distance-time graph.

   b Calculate the speed of her journey :-   (i) to the office   (ii) home.

Answers

Exercise 1 - Time, Distance and Speed

1. a 60 km   b 90 mph   c 2·5 hrs   d 12 secs
2. a 4·5 mins   b 45 m   c 40 km/hr
3. a 2 hrs   b 0·5 hr
4. a 250 metres per min   b 300 metres per min
5. 50 minutes

Exercise 2 - Problem solving - 1/2 & 1/4 hrs

1. a 100 km   b 600 mph   c 3·5 hrs
   d 840 km   e 225 m   f 15 mins
2. a 9 km/hr   b 135 km
3. No - will be 10 minutes late

Exercise 3 - Convert Hrs & Mins to Dec. Times

1. a 0·75 hr   b 0·4 hr   c 0·6 hr   d 0·45 hr
2. a 0·12 hr   b 0·67 hr   c 0·13 hr   d 2·07 hr
3. a 2·55 hr   b 1·8 hr   c 5·1 hr   d 3·05 hr
4. a 220 km   b 40 mph   c 8 hr 24 min
5. 16 minutes

Exercise 4 - Convert Dec. Times to Hrs & Mins

1. a 2 hr 48 min   b 4 hr 24 min
   c 21 mins
2. a 4 hr 36 min   b 8 hr 9 min
   c 3 hr 3 min   d 1 hr 7·5 mins
3. a 3 hr 45 min   b 2 hr 10 mins
   c 54 mins
4. a 72 km/hr   b 900 km/hr
   c 37·8 km/hr   d 0·03 km/hr

5. a (i) Una   (ii) Dale
   b (i) 1 min   (ii) 2 min 30 secs

Exercise 5 - Time, Distance and Speed

1. a 1 hr   b 45 km   c 1·5 hr
   d (i) 45 km/hr   (ii) 60 km/hr
2. a 9 am and 10 am   b 55 km
   c Jack by 10 mins
   d 22 km/hr & 36·7 km/hr
   e 12.22 pm

3/4
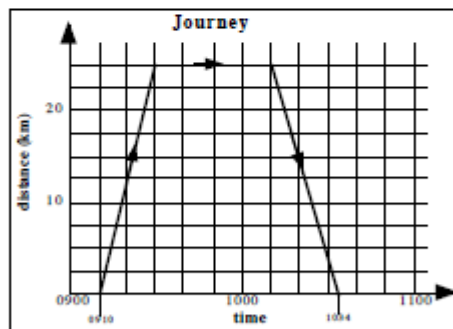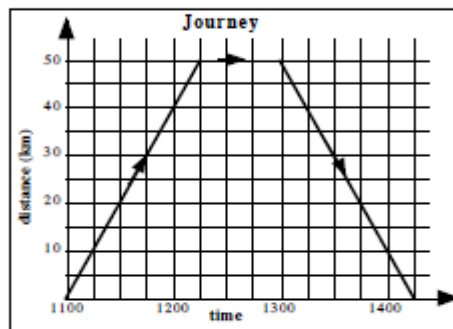
Review - Revisit - Revise Exercise 15

1. a 5 hrs   b 480 mile   c 15 km/hr
2. a 0·8   b 3·2   c 1·7
3. a 2 hr 15 min   b 27 min   c 5 hr 3 min
4. a 56 km/hr   b 96 km
   c Terry - 24 m/hr, Sally - 18 m/hr (Terry)
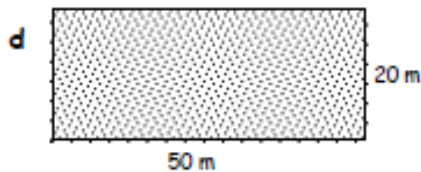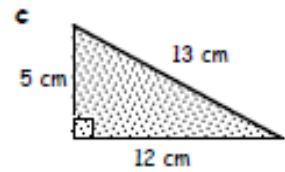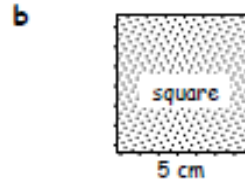   6 m/hr faster

Answers

5. a
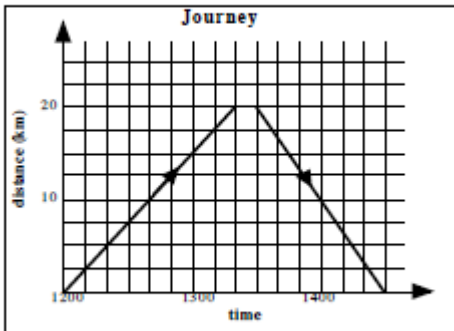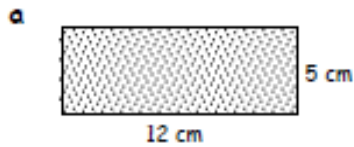

b (i) 15 km/hr   (ii) 20 km/hr

Area

Perimeter & Area

1. Calculate :-   (i) the perimeter   (ii) the area of each shape below :-

a

5 cm

12 cm

b

square

5 cm

5 cm

c

13 cm

5 cm

12 cm

d

20 m

50 m

e

20 cm

200 cm
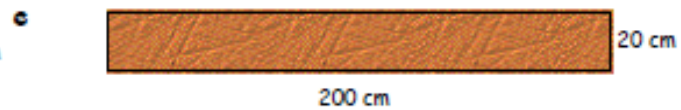
2. Four strips of electrical wire fence surround a rectangular field with area 8000 square metres.

   a Find the width of the field given that the length is 100 metres.

   b What is the total length of wire needed ?

   c The wire costs 18p per metre.

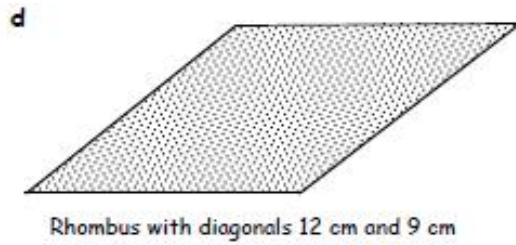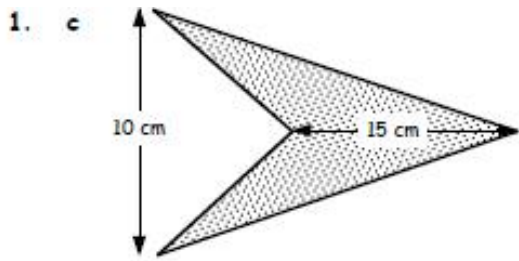   How much will the wire cost in total ?

100 m
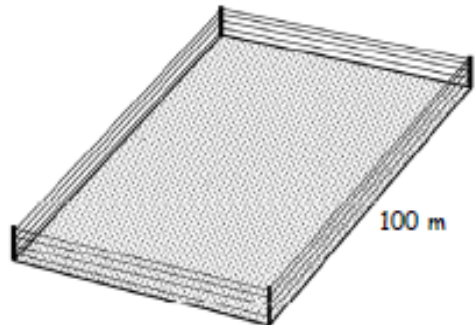
Exercise 2   **Area of a Rhombus & Kite**

1. Using $A = \frac{1}{2}(D \times d)$, calculate the **area** of each rhombus and kite below :-

a

6 cm

10 cm

b

6 cm

5 cm   8 cm

Area
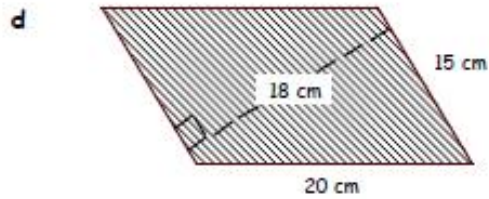
1. c

10 cm, 15 cm
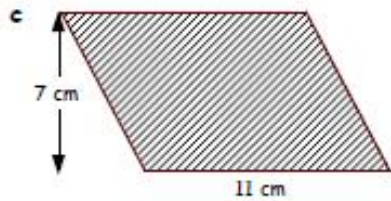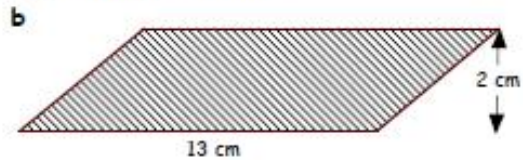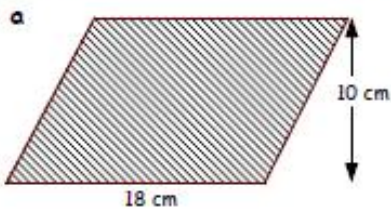
d

Rhombus with diagonals 12 cm and 9 cm
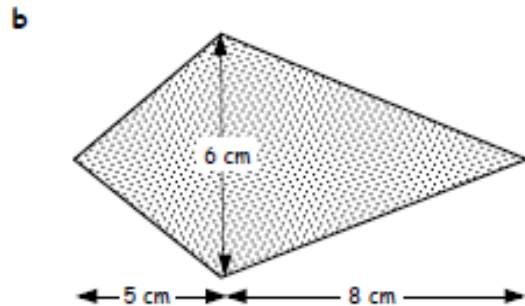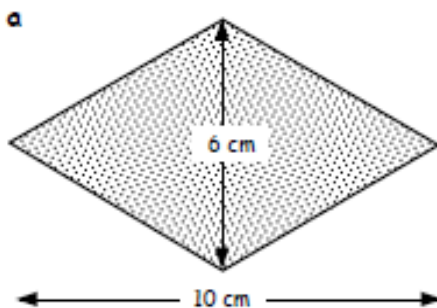
Exercise 3   Area of a Parallelogram

1. Using A = B × H, calculate the **area** of each parallelogram below :-

a

10 cm

18 cm

b

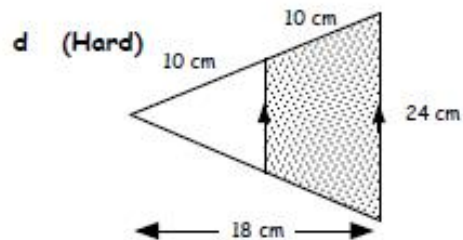2 cm

13 cm

c

7 cm

11 cm

d
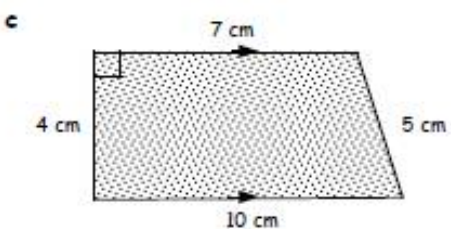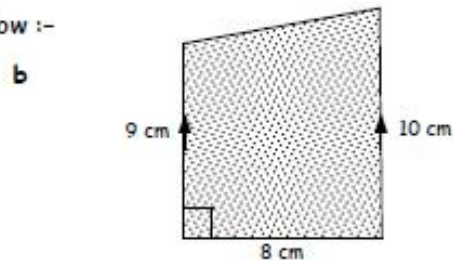

15 cm

18 cm

20 cm

Exercise 4   Area of a Trapezium

1. Calculate the **area** of each trapezium below :-

a

16 cm

10 cm

20 cm

b

9 cm   10 cm

8 cm

c

7 cm

4 cm   5 cm

10 cm

d   (Hard)

10 cm

10 cm

24 cm

18 cm

Area

Composite Areas

1. Calculate the **area** of each composite shape below :-

a

5 cm
6 cm
2 cm
10 cm

b

10 cm
8 cm
5 cm
18 cm

c

6 cm
4 cm
5 cm
3 cm
4 cm
6 cm

d

20 cm
20 cm
10 cm
15 cm
25 cm
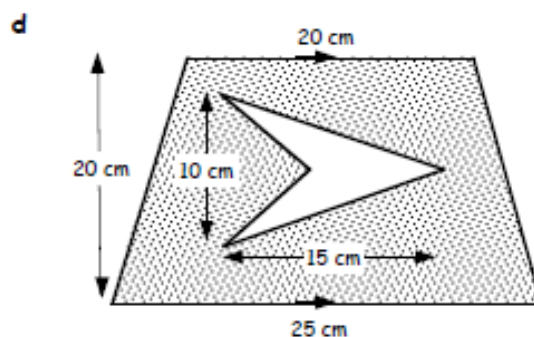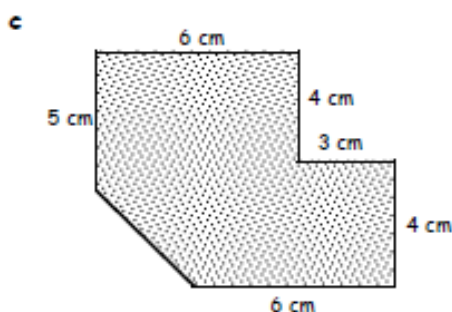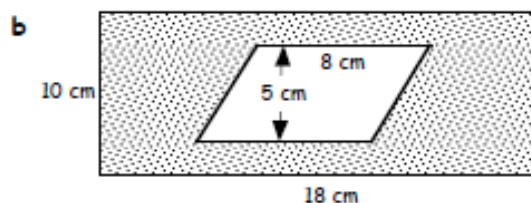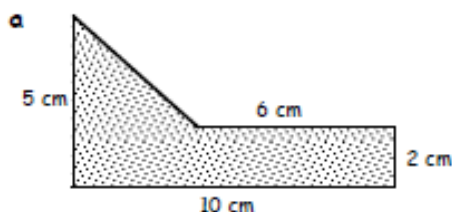
Revisit - Review - Revise Exercise 8

1. For each shape below :-

   (i) name the shape (ii) state the formula used to find its area (iii) find the area.

a

12 cm
10 cm
15 cm

b

15 cm
13 cm
12 cm
25 cm

c

5x
3x
4x

d

3 cm
9 cm
8 cm
5 cm
8·1 cm
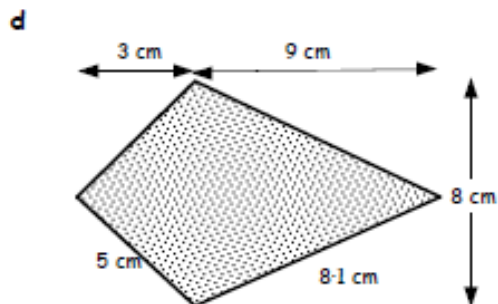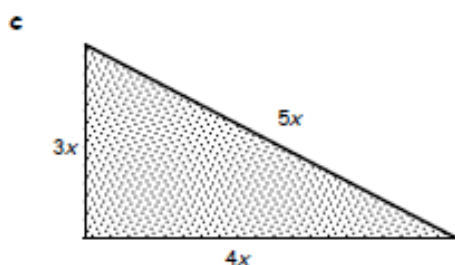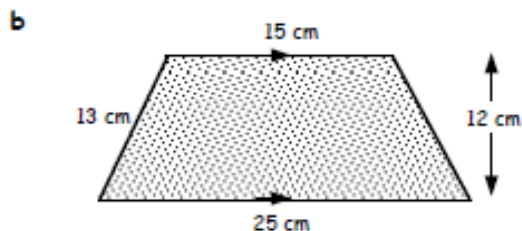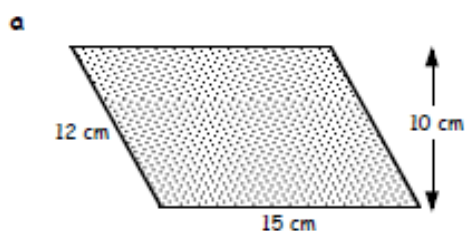
2. Find the **perimeter** of each shape in question 1. (*Shape d has a line of symmetry*).

Answers

Exercise 1 - Perimeter & Area

1. a (i) 34 cm   (ii) 60 cm^2
   b (i) 20 cm   (ii) 25 cm^2
   c (i) 30 cm   (ii) 30 cm^2
   d (i) 140 m   (ii) 1000 m^2
   e (i) 440 cm (ii) 4000 cm^2
2. a 80 m   b 1440 m c £259·20

Exercise 2 - Area of a Rhombus & Kite

1. a 30 cm^2 b 39 cm^2 c 75 cm^2 d 54 cm^2

Exercise 3 - Area of a Parallelogram

1. a 180 cm^2 b 26 cm^2 c 77 cm^2 d 270 cm^2

Exercise 4 - Area of a Trapezium

1. a 180 cm^2 b 76 cm^2 c 34 cm^2 d 162 cm^2

Exercise 5 - Composite Area

1. a 26 cm^2 b 140 cm^2 c 55·5 cm^2 d 375 cm^2

Ratio

Ratio

1. In a cake shop window there are 17 tarts, 9 pies and 11 cakes.

   Write down the ratio of : -

   a tarts : pies   b cakes : total number of items.

2. Write down each ratio in its **simplest form** : -

   a cylinders : cuboids

   b cuboids : triangular prisms

   c cones : cuboids

   d cuboids : total number of shapes
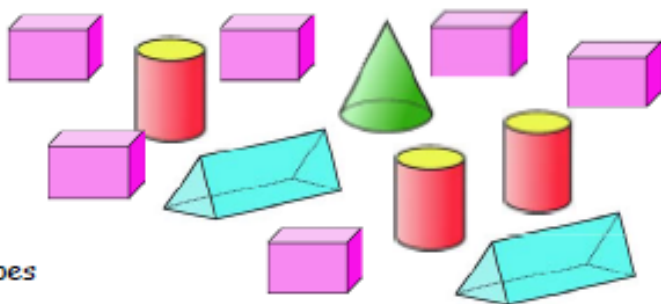
3. Write each of these ratios in its **simplest form** :-

   a 1 centimetre : 1 metre   b 1 minute : 1 hour   c 20 minutes : 4 hours

   d 20p : £5   e 5 days : days in June   f 150 cm : 3 metres.

4. In a week Rhea earns £350, Maggie earns £400 and Vi earns £550.

   Write down each of the following ratios of wages in their **simplest form** : -

   a Rhea : Vi   b Maggie : total wages   c Vi : Maggie : Rhea.

5. In a zoo, the ratio of cats to penguins is 3 : 7.

   a If there are 27 cats, how many penguins must there be ?

   b If there are 42 penguins, how many cats are there ?

6. Mark is making a model plane to a scale of 1 : 40.

   a His model is 20 cm in height. What is the height of the **real** plane, in metres ?

   b The real plane is 20 metres long. What length, in cm, should his **model** be ?

7. Share 35 sweets between Sara and Sue in the ratio of 3 : 2 so that Sara gets the larger share.

Ratio

1. Share £18 000 between Joanne and Paul in the ratio 2 : 7.
   (*Show all your working and remember to check your total comes to £18 000*).

2. Show all your working for each of the following :-

   a   Share £44 000 between Rita and Rose in the ratio 3 : 8.

   b   Share £3200 between Avril and Tam in the ratio 11 : 5.

   c   Share two million pounds between Adam and Eve in the ratio 3 : 2.

3. Each month Jo and Joy spend £20 on Lottery tickets.
   Jo pays £4 and Joy pays £16.

   a   Write the payment as a ratio in its simplest form.

   b   Last week their ticket won £24 000.
   How much money should each receive ?

4. a   Share £90 amongst Gran, Grandad and me in the ratio 1 : 2 : 3.

   b   Share $6000 amongst Jake, Jack and Joe in the ratio 3 : 7 : 10.

Exercise 2   **Proportion**

1. The cost of 5 lemons is £1·50. Find the cost of one lemon.

2. Find the cost per item : -

   a   5 pencils costing 85p   b   9 T-shirts costing £72

   c   7 CD's costing £84   d   11 candles costing £22·55

   e   12 tiles costing £48·60   f   10 mice costing £145.

3. A worm wriggles 240 metres in 4 hours.
   Calculate its travel rate in metres per hour.

4. Razz exchanges £30 for $36. What is the rate of $ per £.

5. John bought 3 identical suits for a total of £96.
   Tim bought two of these suits for £66.

   Who got the better deal ? *Explain.*

Ratio

Direct Proportion

1. The cost of 4 books is £48·80. Find the cost of 3 books.

2. It takes a food mixer 2 minutes to puree 0·7 kg of fruit.
   What weight of fruit could the mixer do in 5 minutes ?

3. a 30 litres of car oil costs £135. Find the cost of 250 litres.

   b It takes 3 hours to iron 90 shirts. How long would it take to iron 20 shirts ?

   c 400 ml of OJ concentrate costs £1·88. What would be the cost of one litre ?

   d 25 metres of cord costs £37·50. How much would it cost for 24 metres ?

4. The time it takes to fill a water tank is directly proportional to its volume.

   a A tank 3 m by 2 m by 1 m takes 3 hours to fill .
   How long would it take to fill a tank 4 m by 3 m by 2 m ?

   b A swimming pool (50 m by 20 m by 4 m) takes 8 hours to fill.
   How long would it take to fill a pool 40 m by 15 m by 3 m ?

Exercise 4 **Linear Graph of Direct Proportion**

1. a Copy and complete this table.

   b Use an appropriate scale to
   plot the points (1, 3), (2, ...), etc.

x	1	2	3	4
y	3	6	9	..

   c (i) Join the points with a straight line.
   (ii) Does the line pass through the origin ?

2. a Copy and complete this table for a bus travelling at 40 km/hr.

   b Using an appropriate scale for your axes,
   plot the points and draw a line through them.

x	1	2	3	4
y	40	80	..	..

   c What distance should the bus travel in :-

   (i) 8 hours   (ii) $6\frac{1}{2}$ hrs ?

3. Does this table indicate direct proportion ?
   Explain.

x	1	2	3	4
y	12	24	32	48

Answers

Chapter 10 : Proportion

Review 9   Ratio

1. a 17:9   b 11:37
2. a 1:2   b 3:1
   c 1:6   d 1:2
3. a 1:100   b 1:60   c 1:12
   d 1:25   e 1:6   f 1:2
4. a 7:11   b 4:13   c 11:8:7
5. a 63   b 18
6. a 8 m   b 50 cm
7. Sara 21, Sue 14

Ch 10 Ex 1   Proportional Division

1. £4000 and £14000
2. a £12000 and £32000
   b £2200 and £1000
   c £1200000 and £800000
3. a 1:4   b £4800 and £19200
4. a £15, £30 and £45
   b $900, $2100 and $3000

Ch 10 Ex 2   Proportion

1. 30p
2. a 17p   b £8   c £12
   d £2·05   e £4·05   f £14·50
3. 60 metres per hour
4. £1 = $1·20
5. John - each suit cost £32. Tim paid £33.

Ch 10 Ex 3   Direct Proportion

1. £36·60
2. 1·75 kg

3. a £1125   b 40 mins
   c £4·70   d £36
4. a 12 hrs   b 3·6 hrs (3hrs 36 mins)

Ch 10 Ex 4   Linear Graph of Direct Proportion

1. a
x	1	2	3	4
y	3	6	9	12

   b (1, 3), (2, 6), (3, 9), (4, 12)
   c (i)   (ii) yes
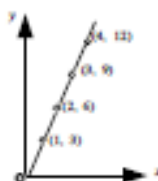
   a
x	1	2	3	4
y	40	80	120	160

   b (1, 40), (2, 80), (3, 120), (4, 160)
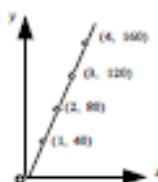
   c (i) 320 km (ii) 260 km
3. No, because the 4 points do not lie on a line
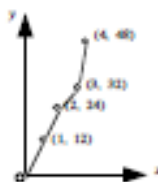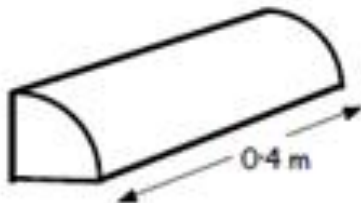
Indirect Proportion

Exercise 8

1. If it took two men 6 hours to build a wall, how long would it have taken 3 men ?
   (Remember : more men - less time)

2. If it took 7 park wardens 6 hours to clear away litter, how long would it have taken 3 wardens ?

3. Six men take 6 hours to build a kit car. How long will it take eight men ?

4. Nine scouts have eight days rations. How many days rations would there then be if **three more** scouts join them ?

5. Oliver and his 5 friends take an hour to wrap all the presents for the church tombola. How long would it have taken if 4 **more** friends had helped with the wrapping ?

6. Five bees take eight days to make 5 millilitres of honey. How many bees would it take to make the same amount in ten days ?

Exercise 9

For each of the following questions show <u>all</u> your working.

1. Tony buys ten stamps for £2·90. How much would he pay for 12 stamps ?

2. Henry can run 4 kilometres in 20 minutes.

   How long would he take to run 5 kilometres at this speed ?

3. Five people should each pay £16 to hire a football pitch.

   If only 4 people turned up, how much would each of them then be expected to pay ?

4. What would be the weight of 12 cakes if 20 cakes weigh 1 kilogram ?

5. The perimeter of a room can be surrounded with fifty 0·4 metre wooden edging strips.

   How many strips of edging would be required if each strip was half a metre in length ?

   0·4 m

Scientific Notation

Exercise 1

1. Copy and complete the following :-

$$39\,000 = 3900 \times 10 = 390 \times .... \times .... = 39 \times .... \times .... \times ....$$

$$= 3.9 \times .... \quad \text{(Stop here, since 3·9 lies between 1 and 10).}$$

$$= 3.9 \times 10^{-}$$

2. Using the same method as Qu 1., write the following numbers in scientific notation :-

(a) 4800
(b) 6780
(c) 31 000
(d) 35 200
(e) 54 350
(f) 970 000
(g) 487 000
(h) 109 100
(i) 4 400 000.

Exercise 2

1. Using the "quick" method, write the following numbers in scientific notation :-

(a) 49 000
(b) 547 000
(c) 234 000
(d) 660
(e) 1482
(f) 9000
(g) 70 000
(h) 1680 000
(i) 47 300 000.

2. You have learned that :-

$$3 \text{ million} = 3\,000\,000 = 3.0 \times 10^{6}$$

$$1.27 \text{ million} = 1\,270\,000 = 1.27 \times 10^{6}$$

Write out each of the following in full, then write each in scientific notation :-

(a) 7 million $= 7\,000\,000 = 7.0 \times 10^{-}$
(b) 2·5 million
(c) 9·19 million
(d) $4\frac{1}{2}$ million
(e) 17 million
(f) 27 million
(g) 2·8 million
(h) 1·97 million
(i) $12\frac{1}{2}$ million
(j) $15\frac{1}{2}$ million
(k) 5·714 million
(l) $5\frac{1}{4}$ million
(m) $6\frac{3}{4}$ million.

Scientific Notation

3. This table gives the areas of various stretches of water throughout the world. Write each of the areas in scientific notation.

Sea / Ocean	Area (km^2)
Pacific Ocean	165 380 000
Atlantic Ocean	82·21 million
Indian Ocean	73·6 million
Mediterranean	2 510 000
River Clyde	2 130
Loch Ness	56
English Channel	103 600

Nessie ?

4. A golf caddie earns £250 000 per annum.

Write his earnings in scientific notation.

5. The population of Canada in May 2004 was 31 million and 629 thousand.

Write this number in scientific notation.

Exercise 3

1. Change each of the following from scientific notation to number form :-

(a) $3·8 \times 10^4$ (b) $7·5 \times 10^2$ (c) $3·24 \times 10^5$ (d) $6·47 \times 10^3$

(e) $1·478 \times 10^4$ (f) 3×10^1 (g) 9×10^6 (h) $2·9 \times 10^6$

(i) $6·014 \times 10^4$ (j) 7×10^7 (k) $5·37 \times 10^7$ (l) $8·888 \times 10^8$.

2.

Player	Valuation
Figo	£1·525 $\times 10^7$
Woodgate	£5·75 $\times 10^6$
Novo	£8·755 $\times 10^5$
Coyle	£3·285 $\times 10^4$
McCracken	£1·004 $\times 10^2$

This table shows the valuation of certain football players as of June 2004.

Write out each of the valuations in full.

Scientific Notation

3. What large numbers are shown on the calculators below ?

(a) $9 \cdot 2$ 5   (b) $3 \cdot 47$ 8   (c) $1 \cdot 42$ 11

4. Write the amount, £1 billion :-

(a) as a very large number in figures.

(b) in scientific notation.
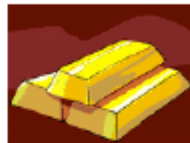
Exercise 4

1. Write the following small numbers in scientific notation :-

(a) 0·003   (b) 0·000 074   (c) 0·0286   (d) 0·000 006

(e) 0·000 482   (f) 0·287   (g) 0·003 93   (h) 0·000 07.

2. Write the following numbers in full :-

(a) $5 \cdot 1 \times 10^{-2}$ (b) $3 \cdot 6 \times 10^{-4}$ (c) $2 \cdot 74 \times 10^{-3}$ (d) $5 \cdot 06 \times 10^{-5}$

(e) $3 \cdot 2741 \times 10^{-1}$ (f) 4×10^{-3} (g) 7×10^{-5} (h) $8 \cdot 009 \times 10^{-6}$.

3. A box of toffees weighs $5 \cdot 81 \times 10^{-2}$ kilograms.

Is this more or less than 58 grams ?

4. What small numbers are shown on the calculators below ?

(a) $3 \cdot 7$ -2   (b) $7 \cdot 09$ -4   (c) $1 \cdot 001$ -1

5. Write out in full :-
(a) $4 \cdot 2 \times 10^{-2}$ (b) $7 \cdot 8 \times 10^{6}$ (b) $8 \cdot 01 \times 10^{-4}$ (d) $9 \cdot 021 \times 10^{3}$.

6. Write in scientific notation :-
(a) 0·003   (b) 5470   (c) 0·000 39   (d) 21 500 000.

Scientific Notation

Revision Exercise

1. Write the following numbers in scientific notation :-

   (a) 400   (b) 8 000   (c) 16 500

   (d) 5 million   (e) 1·89 million   (f) $3\frac{1}{4}$ million

   (g) 70 000   (h) 1 680 000   (i) 47 300 000.

2. Change each of the following from scientific notation to number form :-

   (a) $2\cdot4 \times 10^4$ (b) $6\cdot2 \times 10^2$ (c) $7\cdot361 \times 10^5$ (d) 9×10^7.

3. Write the amount TWO BILLION POUNDS :-

   (a) as a very large number in figures.

   (b) in scientific notation.

4. Write the following small numbers in scientific notation :-

   (a) 0·05   (b) 0·000 092   (c) 0·0274   (d) 0·000 002

   (e) 0·000 175   (f) 0·368   (g) 0·001 81   (h) 0·000 09.

5. Write the following numbers in full :-

   (a) $3\cdot9 \times 10^{-2}$ (b) $2\cdot1 \times 10^{-4}$ (c) $4\cdot97 \times 10^{-3}$ (d) $7\cdot02 \times 10^{-5}$

   (e) $3\cdot2748 \times 10^{-1}$ (f) 5×10^{-3} (g) 9×10^{-5} (h) $3\cdot007 \times 10^{-6}$.

Answers

Exercise 1

1. 3.9×10^4

2. a 4.8×10^3 b 6.78×10^3
   c 3.1×10^4 d 3.52×10^4
   e 5.435×10^4 f 9.7×10^5
   g 4.87×10^5 h 1.091×10^5
   i 4.4×10^6

Exercise 2

1. a 4.9×10^4 b 5.47×10^5
   c 2.34×10^5 d 6.6×10^2
   e 1.482×10^3 f 9×10^3
   g 7×10^4 h 1.68×10^6
   i 4.73×10^7

2. a 7000000 7×10^6
   b 2500000 2.5×10^6
   c 9190000 9.19×10^6
   d 4500000 4.5×10^6
   e 17000000 1.7×10^7
   f 27000000 2.7×10^7
   g 2800000 2.8×10^6
   h 1970000 1.97×10^6
   i 12500000 1.2×10^7
   j 15500000 1.55×10^7
   k 5714000 5.714×10^6
   l 5250000 5.25×10^6
   m 6750000 6.75×10^6

3. Pacific 1.6538×10^8
   Atlantic 8.221×10^7
   Indian 7.36×10^7 Med $2.51 \times 10($
   Clyde 2.13×10^3 Ness $5.6 \times 10($
   Eng Channel 1.036×10^5

4. £2.5×10^5

5. 3.1629×10^7

Exercise 3

1. a 38000   b 750
   c 324000   d 6470
   e 14780   f 30
   g 9000000   h 2900000
   i 60140   j 70000000
   k 53700000   l 888800000

2.   F £15250000   W £5750000
      N £875500   C £32850
      McC £100·40

3. a 920000   b 347000000
   c 142000000000

4. a £1000000000000
   b £1×10^{12}

Exercise 4

1. a 3×10^{-3} a 7.4×10^{-5}
   c 2.86×10^{-2} d 6×10^{-6}
   e 4.82×10^{-4} f 2.87×10^{-1}
   g 3.93×10^{-3} h 7×10^{-5}

2. a 0·051   b 0·00036
   c 0·00274   d 0·0000506
   e 0·32741   f 0·004
   g 0·00007   h 0·000008009

3. More

4. a 0·037   b 0·000709
   c 0·01001

5. a 0·042   b 7800000
   c 0·000801   d 9021

6. a 3×10^{-3} b 5.47×10^3
   c 3.9×10^{-4} d 2.15×10^7

---

1. a 4×10^2 a 8×10^3
   c 1.65×10^4 d 5×10^6
   e 1.89×10^6 f 3.25×10^6
   g 7×10^5 h 1.68×10^6
   i 4.73×10^7

2. a 24000   b 620
   c 736100   d 90000000

3. a 2000000000000
   b 2×10^{12}

4. a 5×10^{-2} b 9.2×10^{-5}
   c 2.74×10^{-2} d 2×10^{-6}
   e 1.75×10^{-4} f 3.68×10^{-1}
   g 1.81×10^{-3} g 9×10^{-5}

5. a 0·039   b 0·00021
   c 0·00497   d 0·0000702
   e 0·32748   f 0·005
   g 0·00009   h 0·000003007