Strathaven Academy

Level 3 – Unit 2

Homework

- Negative Numbers
- Coordinates
- Algebra
- Time
- Fractions and Percentages

Negative Numbers

1. Find :-

   a   4 – 6   b   -2 – 5   c   -3 + 5

   d   3 + (-2)   e   – 5 + (-3)   f   5 – (-2)

   g   -3 – (-3)   h   126 + (-132)   i   -1 + (-1) + (-1).

2. Find :-

   a   -2 + (-3) – (-5) + (-4)   b   28 – (-16) + (-43) – 10   c   123 + (-131) – (-142).

3. Find :-

   a   5 × (-2)   b   (-3) × 8   c   (-2) × (-7)

   d   12 ÷ (-3)   e   (-20) ÷ 4   f   (-24) ÷ (-6)

   g   5 × (-2) × 3   h   (-30) ÷ 6 × (-2)   i   (-1) × (-2) × (-3).

4. Find :-

   a   5 × (-1) × (-3)   b   -3 × (-8) ÷ (-4) ÷ (-2).   c   (-1) × (-1) × (-1) × (-1).

5. The balance in Harry's account read as £845.

   • He withdrew £476 on Monday,

   • He deposited £93 on Tuesday,

   • He withdrew £339 on Wednesday

   • He withdrew £652 on Thursday.

   Write down Harry's new balance.

6. a   The temperature in GeorgeTown was recorded every night at midnight for a week. They were as follows :-

   -3°C,   2°C,   -6°C,   0°C,   -2°C,   -1°C,   3°C.

   Find the **average** temperature for the week. (*The mean*).

   b   The temperature in AbelTown each night last week was :-

   -2°C,   1°C,   -3°C,   -1°C,   -4°C,   4°C,   5°C.

   Which town, on average, was the **colder** of the two ?
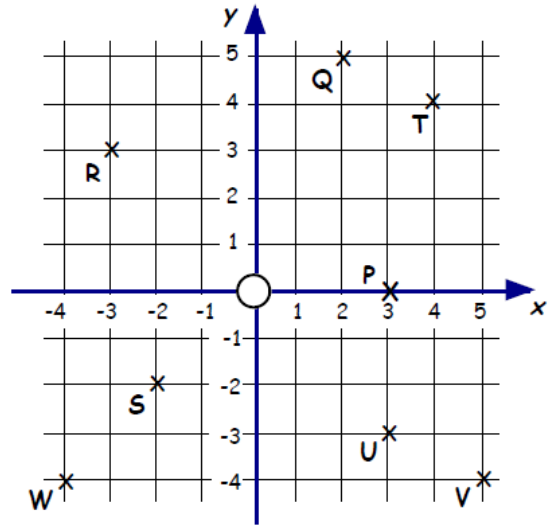
Coordinates

1. From the coordinate diagram :-

    a   Write down the coordinates of the points :-

        (i) Q   **(ii)** R   **(iii)** W   **(iv)** V.

    b   Which points have the same **x coordinate** ?

    c   Which points have the same **y coordinate** ?

    d   Which points have the same **x and y coordinate** ?

2. Draw a set of axes similar to question 1, but make both axes **-7 to 7.**

    a   Plot the following points and join them up in order to reveal a **2D shape.**

        P(1, 4) ⟶ Q(6, 2) ⟶ R(4, -5) ⟶ S(-2, -5) ⟶ T(-4, 2) ⟶ P(1, 4).

    b   What is the name of the shape you have just formed ?

3. Draw another set of axes (**-7 to 7 on both scales**).

    a   Plot the points   A(-1, 7), B(-5, 2) and C(3, -2).

    b   Plot a 4th point (D) so that figure ABCD is a **parallelogram** and write down D's coordinates.

4. Copy the set of axes shown opposite.

    a   Plot the points K(-1, 2), L(-1, 3) and M(-4, 3).

    b   Plot a 4th point (N) so that KLMN is
        a **rectangle.**

    c   Reflect KLMN in the **x axis**, showing
        its new position in your diagram.

    d   Now give your new rectangle a reflection
        over the dotted line, showing its newest
        position on your diagram.

    e   After both reflections, what is the **new**
        coordinates of the point which was
        originally L(-1, 3) ?
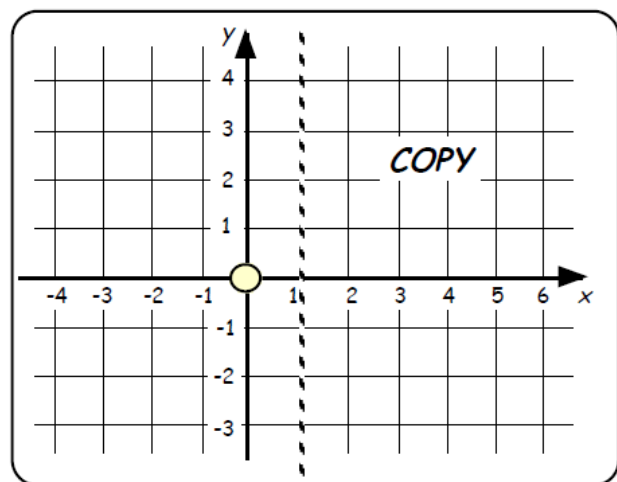
Algebra

1. Copy each of the following and then give a simplified answer below each one :-

   (a) $2x + 5x$ (b) $9x - 4x$ (c) $6x + x$

   (d) $4x - x$ (e) $6x + 5x + x$ (f) $4x + 6x - x$

   (g) $15p - 7p + 4p$ (h) $f + f - f$ (i) $12q - 5q - q$

2. Copy each of the following and then give a simplified answer below each one :-

   (a) $4x + 6x + 3x - 8x$ (b) $6y - y + 4y - 7y$ (c) $3x + 2 + 7x$

   (d) $3p + 5 + p + 3$ (e) $2y + 4 - y - 4$ (f) $3p + 2s + 8p + 9s$

   (g) $8x + z - x + 9z$ (h) $7p + q + 3p + q + p + 4q$ (i) $2p^2 + 2q^2 - p^2 - q^2$

3. Copy each of the following and simplify :-

   (a) $6 \times a$ (b) $7 \times p$ (c) $g \times 8$

   (d) $w \times y$ (e) $c \times c$ (f) $5a \times b$

   (g) $4k \times k$ (h) $4p \times 5q$ (i) $3y \times 7y$

4. Find the value of x by solving these equations :-

   (a) $x + 2 = 5$ (b) $x + 8 = 10$ (c) $x + 5 = 12$

   (d) $x + 12 = 13$ (e) $x - 1 = 5$ (f) $x - 2 = 20$

5. Find the value of x, given :-

   (a) $3x = 18$ (b) $4x = 12$ (c) $5x = 50$

   (d) $9x = 45$ (e) $6x = 42$ (f) $2x = 11$

6. Find the value of each letter by solving these equations :-

   Set down your working carefully.

   (a) $2s + 3 = 5$ (b) $4d + 3 = 11$ (c) $3f + 1 = 13$

   (d) $5w + 3 = 43$ (e) $2e - 1 = 9$ (f) $6g - 3 = 15$

   (g) $7g - 2 = 19$ (h) $7b - 5 = 2$ (i) $10f - 5 = 15$

7. Solve these inequalities, leaving your answers like :- $x > 3$.
   (Show all your working carefully)

   (a) $x + 2 > 7$ (b) $x + 5 > 12$ (c) $x + 3 \leq 9$

   (d) $4x < 24$ (e) $5x > 45$ (f) $2x \leq 11$

   (g) $2x + 3 > 13$ (h) $3x - 5 < 10$ (i) $4x + 7 \geq 17$

Time

1. Change the following 12 hour clock times to <u>24 hour clock times</u> :-

    (a)   2·15 am   (b)   4·20 am   (c)   6 am

    (d)   5·20 pm   (e)   1·45 pm   (f)   7 pm

    (g)   6·25 am   (h)   9·50 pm   (i)   1·15 am

    (j)   10·35 am   (k)   midnight   (l)   12·20 am

    Remember :-   0630 —> 6·30 <u>am</u>   1745 —> 5·45 <u>pm</u>

2. Change the following 24 hour clock times to <u>12 hour clock times</u> :-

    (a)   0430   (b)   1040   (c)   0704

    (d)   1450   (e)   1735   (f)   2050

    (g)   0150   (h)   2145   (i)   2205

    (j)   1902   (k)   0000   (l)   0555

3. How long is it from :-

    (a)   2·45 pm to 5·45 pm   (b)   4 am to 8·30 am

    (c)   midnight to 4·30 am   (d)   7·55 pm to 9·15 pm

    (e)   3·40 am to 5·10 am   (f)   4·10 am to 9·35 am ?

4. A show started at 7·35 pm and went on till 10·15 pm.
    For how long had the show lasted ?

    I boarded a train at 11·55 am and my journey lasted for 2 hours and 35 minutes.
    At what time did I reach my destination ?

5. My flight to Athens left London Heathrow Airport at 2250 on Friday night.
    I arrived at Athens Airport at 0315 on Saturday morning (British time).

    How long had my flight taken ?

Time

6. Shown is part of the bus timetable from Reully to Pembrose.

	Reully → Morth → Caber → Abbey → Pembrose				
0945 Bus	0945	1020	1155	1225	1320
1415 Bus	1415		1625	1655	

(a) How long does the 0945 bus take to travel from :-

    (i) Reully to Caber ?   (ii) Caber to Abbey ?   (iii) Abbey to Penbrose ?

(b) Assuming that the 1415 bus travels at the same speed as the 0945 bus, when would it be expected to arrive at :-

    (i) Morth ?   (ii) Pembrose ?

Fractions and Percentages

1. Change each pecentage to a decimal and then to a fraction in its simplest form :-

   a   75%   b   35%   c   5%

   d $66\frac{2}{3}$%   e   43%   f   12·5%.

2. Change each of the following into a percentage :-

   a   0·63   b   0·2   c   0·005

   d $\frac{7}{10}$ e $\frac{4}{5}$ f $\frac{11}{20}$.

3. Find :-

   a $\frac{3}{10}$ of 240 kg   b   0·8 of 120 cm   c   3% of £1200

   d   75% of £460   e $12\frac{1}{2}$% of 48·8 km   f   93% of 2000 mm.

4. a   Jake earned £280 a week as a joiner.
   He then got a 10% pay rise.

   How much was his pay rise ?

   b   A joiner has a plank of wood 1400 cm long.
   He cuts off three sevenths of the wood.

   What length of wood did he cut off ?

   c   The cost of a dress in a shop was £80.
   A sale gave a 25% **discount** on the dress.

   How much is the dress in the sale ?

   d   A pair of shoes are priced at £140.
   The manager **increases** the price by 5%.

   How much do the shoes cost now ?

5. Peter sets out on a journey of 200 km.

   He drives 85% of his journey and stops.

   How many kilometres does he still have to travel ?

Fractions and Percentages

6. Find :-

    a   35% of £360

    b $\frac{7}{11}$ of $1375

    c   7% of 7 km

    d $\frac{1}{2}$% of £2

    e $87\frac{1}{2}$% of £10

    f   25% of 30% of 600.

7. a   Katy earns £8 an hour as a cleaner.

        She gets a pay rise of 6%.

        How much will she **now** get for working 25 hours ?

    b   Katy buys a large bottle cleaning fluid which contains 4200 ml.

        A new bottle contains 22% **more**.

        How many ml does the new bottle contain ?

8. a   Caitlin's boutique buys shoes at £80 a pair. Caitlin sells them at a **profit** of 40%.

        How much profit does she make if she sells 20 pairs of shoes ?

    b   15% of the milk delivered to a superstore is thrown out **every week** as wastage.

        How much milk is thrown out each week, given that 120 litres are delivered **every day** ?

9. a   Leila buys an 8 metre length of material to make curtains.

        She uses 95% of the material.

        How much material is left over ?

    b   The curtain material costs £17 per metre form "FabricShop".

        "CurtainStore" sells the same material 6% cheaper.

        How much would Leila save on her 8 metres at "CurtainStore" ?

10. Gavin earns £18 000 a year as a salesperson.

    Bethany earns three eighths **more** than Gavin.

    Tom earns 4·5% **less** than Gavin.

    How much more does Bethany earn than Tom ?

11. A new car costs £15 000 from **Kevins Cars**.

    It can be bought by making 30 monthly payments of £500.

    Arnies Cars has a "**special offer**" and is advertised as shown.

    Comment on **Arnies** "special offer".

    Arnie's Special Deal
    Best offer around !
    Pay 10% deposit then ONLY
    £460 for 30 months.

# Strathaven Academy

Level 3 – Unit 2

Revise and Review

- Negative Numbers
- Coordinates
- Algebra
- Time
- Fractions and Percentages

This section provides further examples that may be used to revise prior to the Unit 2 Test or for consolidation and review as required on completion of the unit.

Negative Numbers

1. Write the temperature shown by each thermometer.

    (a)
    -10°C   -5°C   0°C   5°C   10°C

    (b)
    -20°C   -10°C   0°C   10°C   20°C
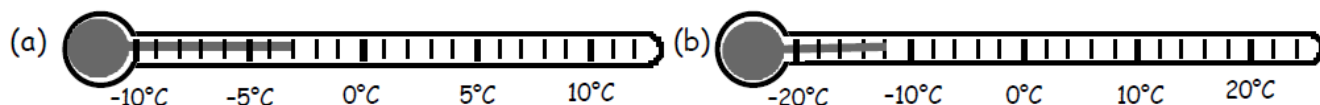
2. Yesterday the temperature was 5°C.
    Last night the temperature dropped by 12°C. What was the new temperature ?

3. Find   (a) 7 + (-3)   (b) (-5) + 9   (c) (-3) + (-5)   (d) (-7) – 2   (e) (-15) – 5

4 . The afternoon temperature on a mountain top is recorded at 4°C.
    The temperature drops by 16°C at night.

    What is the night-time temperature ?

5 . A liquid is at a temperature of 25°C. Its freezing point is –18°C.

    How many degrees will the temperature have to drop to freeze the liquid ?

6 . Find :-

    (a)   4 + (-2)   (b)   6 + (-8)   (c)   11 + (-20)   (d)   -3 + (-2)

    (e)   -1 + 7   (f)   -45 + (-33)   (g)   16 + (-19)   (h)   4 - (-2)

    (i)   5 - (-11)   (j)   -6 - (-5)   (k)   3 × (-2)   (l)   5 × (-5)

    (m) (-8) × 4   (n)   (-6) × (-5)   (o)   (-12) × (-10)   (p)   (-14) ÷ 2

    (q)   (-36) ÷ 4   (r)   8 ÷ (-2)   (s)   (-60) ÷ (-12)   (t)   (-150) ÷ (-25)

7 . Calculate :-

    (a)   (12 + (-3)) × 2   (b)   ((-14) – (-6)) ÷ 2   (c)   8 × (4 – (-5)) ÷ 3

8 . Simplify :-

    (a)   4a + (-2a)   (b)   32g – (-12g)   (c)   -5z - (-5z)

    (d)   6b + 2c + (-5b) – (-c)   (e)   7h + (-3k) – 2k – (-h)   (f) $x + (-1)^2 + (-x) + (-1)^7$

Coordinates

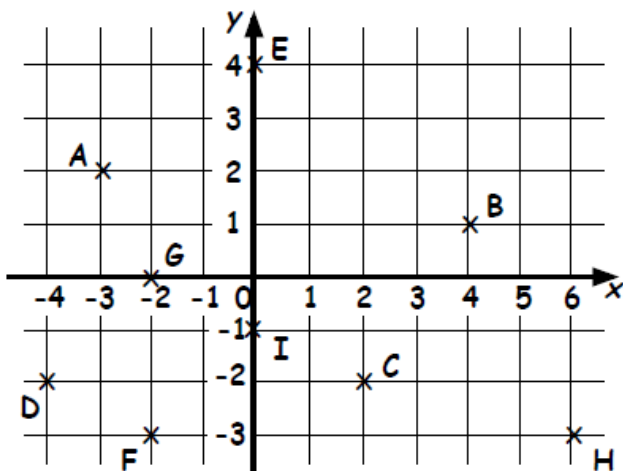## Exercise 5

1. Look at this coordinate diagram.

    The coordinates of A are

    A(-3,2)

    Write down the coordinates
    of the other 8 points.


2. Draw a <u>large</u> set of axes (-10 to 10 on both scales).
    Plot each set of points, join them up and state what shape each is :-

    (a) A(3,3) B(5,4) C(7,3) D(5,-2).

    (b) E(-7,5) F(-5,8) G(2,8) H(0,5).

    (c) I(-10,3) J(-8,3) K(-9,-3).

    (d) L(1,-5) M(-4,-4) N(-5,1) O(0,0).

    (e) P(4,-5) Q(6,-7) R(5,-9) S(3,-9) T(2,-7) P(4,-5).

    (f) U(-8,-3) V(-6,-3) W(-5,-5) X(-6,-7) Y(-8,-7) Z(-9,-5) U(-8,-3).

3. (a) Copy this diagram and plot the three points
        P(-3,2), Q(5,2) and R(5,-3).

    (b) Try to find a 4th point, (call it S) such that
        PQRS is a rectangle. Show S on your diagram,
        and write down its coordinates.
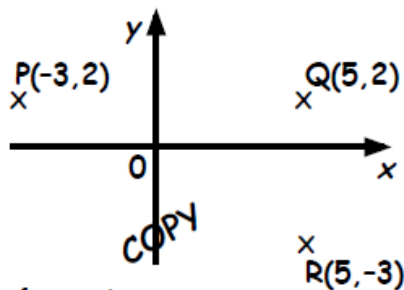
4. (a) Draw a set of axes, (-6 to 6 on both scales) and plot the four points
        A(2,1), B(3,5), C(5,5), D(6,1).

    (b) Join the four points and state which type of shape is formed.

    (c) "Flip" each of the four points over the x-axis to form a new four-sided shape.
        (This is called "**REFLECTING**" the shape).

    (d) Write down the coordinates of the four corners of this new reflected shape.

5. Draw a set of axes, (-5 to 5 on both scales). Join each of these sets of points with lines :-

(2, 3) to (4, 3)	(1, 0) to (1, -2)	(-2, 0) to (-4, 0)	(-1, -3) to (-1, -5)
(-1, 2) to (1, 2)	(-3, 1) to (-3, 3)	(-1, -5) to (-3, -5)	(2, 1) to (2, 3)
(2, 0) to (3, -1)	(0, -4) to (2, -3)	(-1, 3) to (-1, 1)	(3, -1) to (3, -2)
(-3, -3) to (-3, -5)	(-1, 0) to (-1, -2)	(2, 2) to (4, 2)	(0, -3) to (0, -5)
(-1, 0) to (1, 0)	(-4, -2) to (-3, -2)	(-1, 3) to (1, 3)	(-1, -1) to (1, -1)
(0, -4) to (2, -5)	(-1, 1) to (1, 1)	(-3, 0) to (-3, -2)	(2, 1) to (4, 1)
(4, 0) to (3, -1)	(-3, -3) to (-1, -3)	(-4, 3) to (-2, 3)	

    What message is produced ?

6. (a) Draw a set of axes from -5 to 5 on both axes.

    (b) Plot the points A(3, 1), B(-3, 1) and C(-3,-3).

    (c) Plot and write the coordinate of a 4th point (call it D), such that ABCD is a rectangle.

    (d) Reflect the rectangle over the y axis and write down the coordinates of its vertices.

Algebra

1. Simplify :-

(a) $8x + 4x$

(b) $6y - 2y$

(c) $5k + 2k - 4k$

(d) $8d - 7d$

(e) $w + 3w - 2w$

(f) $4h^2 + 5h^2 - 3h^2$

2. Write the unknown number :-

(a) $5 \rightarrow \times 3 \rightarrow + 6 \rightarrow ?$

(b) $8 \rightarrow \div 2 \rightarrow - 5 \rightarrow ?$

(c) $? \rightarrow \times 6 \rightarrow + 1 \rightarrow 31$

(d) $? \rightarrow \div 3 \rightarrow + (-1) \rightarrow 3$

3. If $s = 2$, $t = 3$, $u = 4$ and $v = 5$ find :-

(a) $3s + 2t + u - 2v$

(b) $stu - 5v$

(c) $v^2 + u^2 - (st)^2$

4. Solve :-

(a) $x + 6 = 8$

(b) $y - 7 = 9$

(c) $2x + 1 = 11$

(d) $5h - 7 = 43$

(e) $\frac{1}{2}k = 16$

(f) $\frac{1}{5}y + 1 = 3$

5. Solve :-

(a) $x + 4 > 10$

(b) $y - 1 < 9$

(c) $3x \leq 15$

(d) $2y \leq 13$

(e) $3k - 10 \geq 0$

(f) $\frac{1}{2}w + 1 \geq 5$

Time

1. Write the following in 24 hour time :-

(a) 9·20 am

(b) 4·50 pm

(c) 11·05 pm

(d) 6·15 pm

2. Write the following in 12 hour time :-

(a) 0110

(b) 1715

(c) 2310

(d) 0001

3. A train left the station at 1105 and arrived at its destination at 1750. How long was the journey ?

4. A paper round started at 6·25 am and took 1 hour 50 mins. What time did the round finish ?

5. Shown is a train timetable

-- -- denotes express
train and does not
stop at the station.

|					
Glasgow	09 00	11 30	14 16	17 53	
Garrowhill	09 09	11 39	-- --	-- --	-- --
Blairhill	09 12	11 42	-- --	-- --	23 03
Sunnyside	09 14	11 44	-- --	-- --	23 09
Airdrie	09 17	11 47	14 33		23 12

(a) How long does it take the first train from Garrowhill to Airdrie ?

(b) The last train takes 16 minutes from Glasgow to Airdrie. What time does the train leave ?

(c) What time will the 1753 express from Glasgow arrive at Airdrie ? (Look at the 1416 express)

Fractions and Percentages

1. For each shape, say what fraction has been shaded :-

(a) (b) (c) (d)
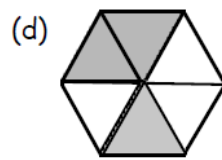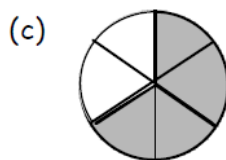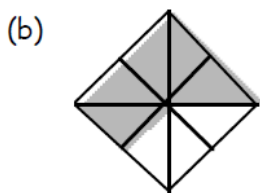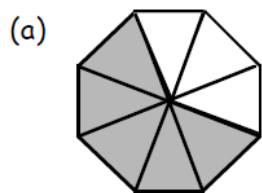
2. Simplify each of the following fractions :-

(a) $\dfrac{7}{14}$ (b) $\dfrac{3}{12}$ (c) $\dfrac{14}{42}$ (d) $\dfrac{11}{88}$

(e) $\dfrac{12}{78}$ (f) $\dfrac{6}{84}$ (g) $\dfrac{25}{625}$ (h) $\dfrac{27}{126}$

3. Find :-

(a) $\dfrac{1}{3}$ of 66 (b) $\dfrac{3}{4}$ of 48 (c) $\dfrac{8}{9}$ of 27 (d) $\dfrac{5}{7}$ of 616

4. Write these as fractions in their simplest form :-

(a) 50% (b) 25% (c) 64% (d) 75%

(e) 20% (f) $66\frac{2}{3}$% (g) $33\frac{1}{3}$% (h) 12·5%

5. Change these fractions into percentages :-

(a) $\dfrac{7}{10}$ (b) $\dfrac{2}{5}$ (c) $\dfrac{1}{3}$ (d) $\dfrac{17}{20}$

(e) $\dfrac{24}{40}$ (f) $\dfrac{20}{30}$ (g) $\dfrac{225}{1000}$ (h) $\dfrac{3}{8}$

6. Calculate :-

(a) 20% of £75 (b) 65% of $840 (c) $12\frac{1}{2}$% of 808 kg

7. Kris had £120, ($\dfrac{3}{5}$ of his original holiday money). How much did Kris start with ?

8. Find without a calculator :-

(a) 50% of £9 (b) $33\frac{1}{3}$% of 360 metres (c) 80% of 90 €

(d) 25% of 300p (e) 60% of 240 p (f) $66\frac{2}{3}$% of 121 kg

(g) 70% of 520 cm (h) 75% of 9600 kg (i) 75% of £440

(j) 30% of 3100 km (k) 75% of £5 (l) $66\frac{2}{3}$% of 1·2 kg

Answers

Negative Numbers

1. a -3°C   b -12°C
2. -7°C
3. a 4   b 4   c -8   d -9
      e -20
4. -12°C
5. 43°
6.

a 2	b -2	c -9	d -5
e 6	f -78	g -3	h 6
i 16	j -1	k -6	l -25
m -32	n 30	o 120	p -7
q -9	r -4	s 5	t 6

7. a 18   b -4   c 24
8. a $2a$ b $44g$ c 0
   d $b + 3c$ e $8h - 5k$ f 0

Coordinates

1. B(4,1) C(2,-2) D(-4,-2) E(0,4)
   F(-2,-3) G(-2,0) H(6,-3) I(0,-1)
2. a. kite   b. parallelogram
   c. line   d. rhombus
   e. pentagon   f. hexagon
3. a. See diagram   b. S(-3,-3)
4. a. See diagram   b. trapezium
   c. See diagram
   d. (2,-1) (3,-5) (5,-5) (6,-1)
5. TEEJAY OK

6. . a/b   see diagram   c   D(3,-3)
   d A'(-3,-1) B'(2,1) C'(2,-3) D'(-3,-3)

Answers

Algebra

1. a $12x$ b $4y$ c $3k$ d d
   e $2w$ f $6h^2$
2. a 21   b -1   c 5   d 12
3. a 6   b -1   c 5
4. a $x = 2$ b $y = 16$ c $x = 5$ d $h = 10$
   e $k = 32$ f $y = 10$
5. a $x > 6$ b $y < 10$ c $x \leq 5$
   d $y \leq \dfrac{13}{2}$ e $k \geq 4$ f $w \geq 8$

Time

1. a 0920   b 1650   c 2305   d 1815
2. a 1·10 am   b 5·15 pm   c 11·10 pm   d 12·01 am
3. 6 hrs 45 mins
4. 8·15 am
5. a 8 mins   b 2256   c 1810

Fractions and Percentages

1. a $\dfrac{5}{8}$ b $\dfrac{5}{8}$ c $\dfrac{4}{6}$ $\left(\dfrac{2}{3}\right)$ d $\dfrac{1}{2}$
2. a $\dfrac{1}{2}$ b $\dfrac{1}{4}$ c $\dfrac{1}{3}$ d $\dfrac{1}{8}$
   e $\dfrac{2}{13}$ f $\dfrac{1}{14}$ g $\dfrac{1}{25}$ h $\dfrac{3}{14}$
3. a 22   b 36   c 24   d 60
4. a $\dfrac{1}{2}$ b $\dfrac{1}{4}$ c $\dfrac{16}{25}$ d $\dfrac{3}{4}$
   e $\dfrac{1}{5}$ f $\dfrac{2}{3}$ g $\dfrac{1}{3}$ h $\dfrac{1}{8}$
5. a 70%   b 40%   c $33\dfrac{1}{3}\%$ d 85%
   e 60%   f 66%   g $22\dfrac{1}{2}\%$ h $37\dfrac{1}{2}\%$
6. a £15   b $36   c 101 kg
7. £200

8. a £4·50   b 120 m   c 72€   d 75p
   e 144p   f 80 kg   g 364 cm   h 7200 kg
   i £330   j 930 km   k £3·75   l 0·8 kg