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Number

- 1 **a** $\frac{2}{5}$ **b** 60% **c** Any 13 squares shaded.
- 2 **a** Nineteen thousand, four hundred and seventy-six.
b 400 **c** 19 000 **d** 21 976 **e** 21 980
- 3 **a** 1, 25, 36, 64 **c** 3, 7, 17, 19 **e** 30, 36, 42
b 1, 8, 27, 64 **d** 1, 7, 8, 14, 28
- 4 $\frac{4}{9}$ $\frac{1}{2}$ $\frac{2}{3}$ $\frac{5}{6}$
- 5 **a** 67×48 is approximately the same as 70×50
 $70 \times 50 = 3500$, so 67×48 must be approximately 3500.
b The actual number should be less than 3500 because 67 is less than 70, and 48 is less than 50, so both numbers were rounded up for the estimate.
c 3216.
One method of answering this is as follows:
- | | | | |
|----------------|------|-----|------|
| 67×48 | 60 | 7 | |
| 40 | 2400 | 280 | 2680 |
| | | | + |
| 8 | 480 | 56 | 536 |
| | | | 3216 |
- $67 \times 48 = 3216$
- 6 The sweatshirt from the shop is cheaper.
 $\frac{2}{3}$ of £16.50 is £11.00, and 20% off £13.90 is £11.12.
- 7 **a** 125 **b** 20 **c** 10 **d** -2

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Fraction	Decimal	Percentage
$\frac{3}{10}$	0.3	30%
$\frac{13}{20}$	0.65	65%
$\frac{5}{8}$	0.625	62.5%
$\frac{1}{3}$	0.333...	$33\frac{1}{3}\%$
$\frac{21}{25}$	0.84	84%
$\frac{4}{25}$	0.16	16%

9 a i 3:5 ii 2:3 iii 3:2 iv 1:5

b 46 men

c i $3:7 = 21:49$ ii $18:30 = 3:5$ iii $2\frac{1}{2} : 5\frac{3}{4} = 10:23$

10 a 23 cm **b** 30% increase

11

a $\boxed{0.1} \times \boxed{0.05} = 0.005$ or $\boxed{0.05} \times \boxed{0.1} = 0.005$

b $\boxed{10} \div \boxed{0.1} = 100$

12 a 4^8 **b** 3^6 **c** t^{12} **d** m^3

13 375 g

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Worksheet answers

Statistics

1 a

Number of people in vehicle	Tally	Frequency
1	 	16
2	 	8
3		3
4		2
5		1

b One person

c Discrete – you can only have whole numbers of people in the vehicles.
Quantitative – the data is numerical, not descriptive.

2 a Games b Dancing c 12 d 18 e 16 f 62

3 a

Time spent (t sec)	Tally	Frequency
$45 \leq t < 50$		2
$50 \leq t < 55$		4
$55 \leq t < 60$	 	6
$60 \leq t < 65$	 	8
$65 \leq t < 70$	 	5
$70 \leq t < 75$	 	5

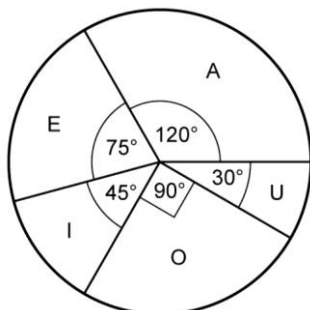
b $\frac{12}{30} = \frac{2}{5}$

4 a $\frac{2}{5}$ b $\frac{3}{10}$ c 0

5 a 3 b 4 c 6 d 5

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7 a

+	1	2	3	4
3	4	5	6	7
4	5	6	7	8
5	6	7	8	9

b $\frac{1}{2}$

c $\frac{1}{4}$

8 Answers may vary. Suggestions are:

10 is too small a sample to get a true analysis of the situation.

People coming out of a gym are likely to be health conscious anyway, so the sample is biased.

9 $\frac{5}{12}$

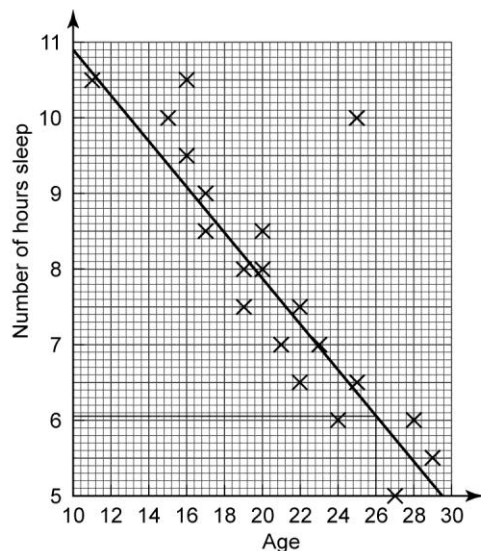
10 a 32.8 **b** 30 **c** 43

d Asif's group did better overall than Julia's, as shown by a higher mean. The range in Asif's group was the same as in Julia's group. The lowest mark overall was in Julia's group, and the highest mark was in Asif's group.

11 a 2 **b** 3 **c** 2.7

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12 a



- b** 6.05 hours (this may vary depending on the position of the line of best fit).
c The graph shows negative correlation. In general, the higher the age of a person, the lower the number of hours sleep that is thought to be needed.

13 a 0.72

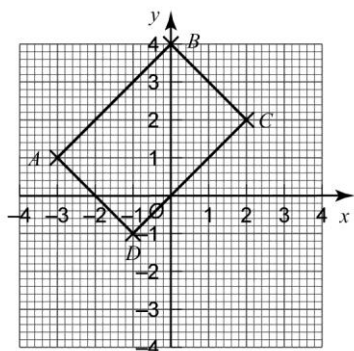
- b** Approximately 29 times because $0.72 \times 40 = 28.8$, which rounded to the nearest whole number is 29.

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Algebra

1 a i 5 ii subtract 6 b i 6.3 ii add 1.3

2 a b c



d $D(-1, -1)$

3 a $3t$ minutes

b $t + 10$ minutes

c $5t + 30$ minutes

d 100 minutes

4 a $C = 6n + 15$

b £57

c 11 days

5 a $x = 2$

b $c = 16$

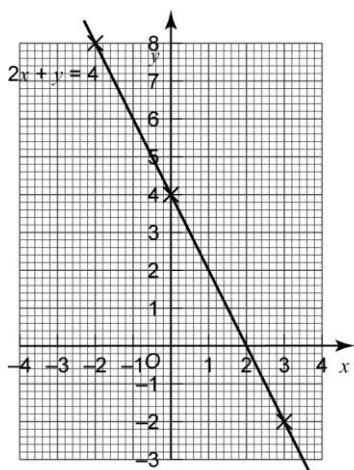
c $q = -4$

d $k = 9$

6 a

x	-2	0	3
y	8	4	-2

b



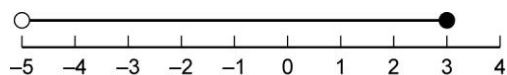
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7 $y = x$

8 $4n + 3 = 27$ Mark's number is 6

9 a -4, -3, -2, -1, 0, 1, 2, 3

b



10 4, 11, 18

11 a $4(3a + 2b)$

b $x(y - 2)$

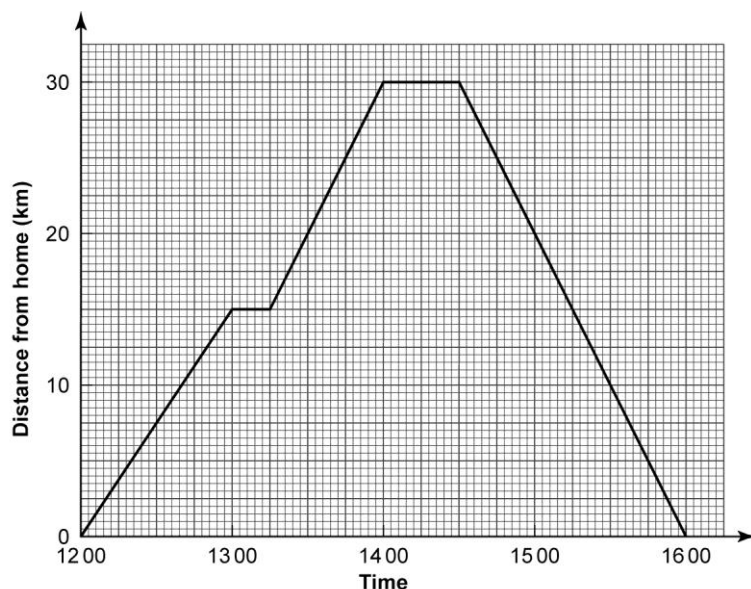
c $2k(k + 3)$

d $3p(q^2 - 4pr)$

12 a i 1300

ii 15 kilometres per hour

b



13 a $11x + 11y$

b $13m + 3$

14 a 33, 39

b add six

c $6n - 3$

d 117

15 $y \leq 2.7516$

16 a $a = 9$ **b** $x = -1$

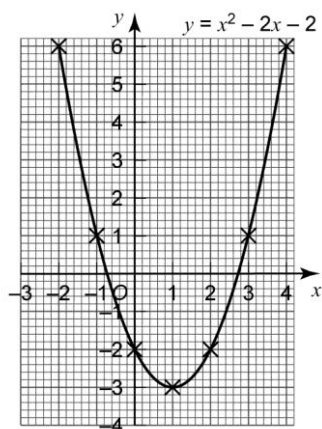
17 $x = 4.3$

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18 a

x	-2	-1	0	1	2	3	4
y	6	1	-2	-3	-2	1	6

b



c $x = 1$

d (1, -3)

e $x = -0.7$ or 2.7

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Geometry and measure

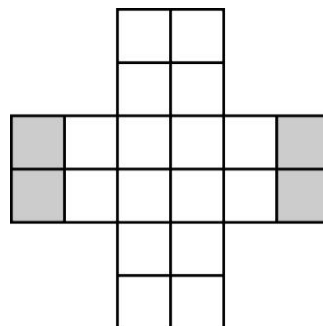
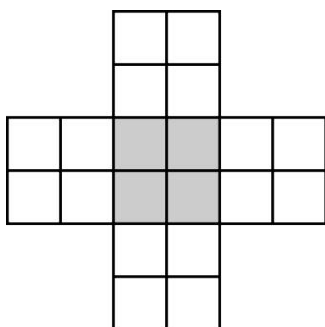
1 **a** x is an obtuse angle

b w is an acute angle

c z is a reflex angle

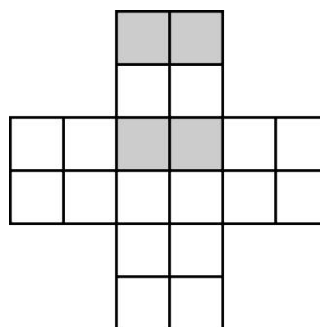
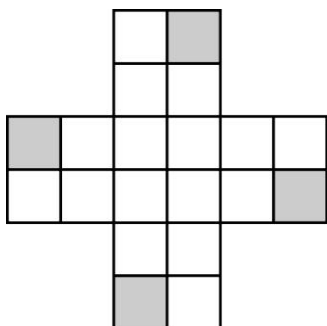
2 **a**

b There is more than one solution.
For example:



c There is more than one solution.
For example:

d There is more than one solution.
For example:



3 No, she will not have enough flour.

500 grams is half a kilogram, and a kilogram is approximately the same as 2.2 pounds.
So 500 grams is approximately 1.1 pounds, and Zara needs 1.25 pounds.

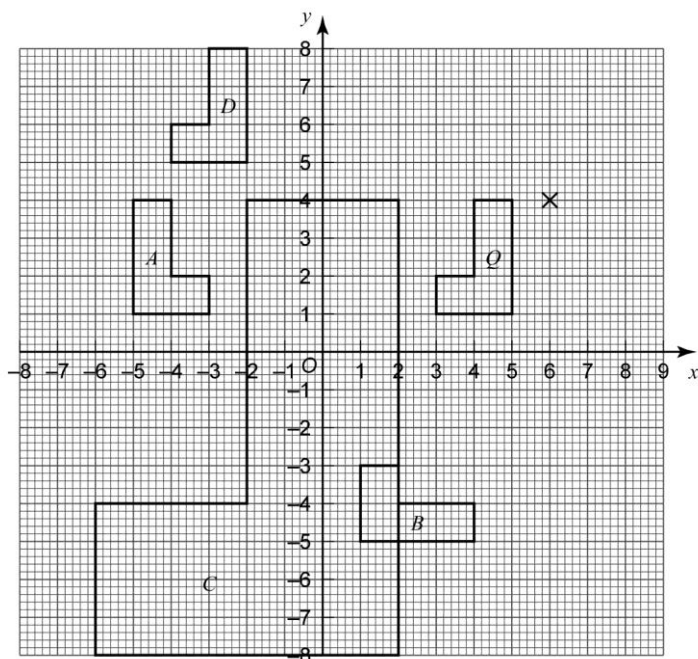
4 **a** Isosceles

b 74°

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5 $a = 116^\circ$ $b = 69^\circ$ $c = 133^\circ$

6

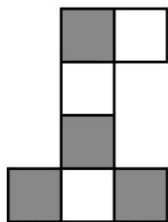


- 7 **a** 065° **b** 63° **c** 333°
8 a 23.56 cm^2 **c** 10.675 m^2 **e** 5.31 m^2 (2 d.p.)
b 66.36 cm^2 **d** 15.26 cm^2
9 a 32 cm^2 **b** 384 cm^3 **c** 424 cm^2

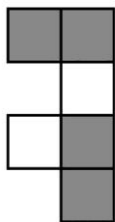
10 9 kilometres per hour

11

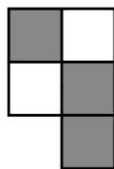
a Side elevation A



b Side elevation B



c Plan view



12 **a** A rotation of 90° anticlockwise about the origin.

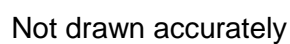
b A translation on the vector $\begin{pmatrix} -10 \\ -4 \end{pmatrix}$.

c An enlargement, scale factor 2, centre of enlargement the point $(-1, -4)$.

d A reflection in the line $y = x$

e A reflection in the line $x = 1$

13 a Student's accurate drawing.



b $PS = 37.75\text{m}$ (2 d.p.)

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Essential skills

- 1 4 or 5 digits.

The smallest answer is from multiplying $100 \times 10 = 1000$

The largest answer is from multiplying $999 \times 99 = 98\,901$

- 2 Peter is only correct for positive numbers, but half a negative number is greater than the number itself.

For example, half of -1 is $-\frac{1}{2}$ and $-\frac{1}{2} > -1$

- 3 $\frac{1}{7} = 0.1428\dots$ which is 14 % rounded **down** to the nearest per cent.

$\frac{2}{7} = 0.2857\dots$ which is 29% rounded **up** to the nearest per cent.

- 4 The probability of getting a red counter from bag A is $\frac{8}{20} = 0.4$

The probability of getting a red counter from bag B is $\frac{7}{16} = 0.4375$

The probability of choosing a red counter is greater from bag B.

- 5 Triangle BED is isosceles.

Angle $ABD = 90^\circ$

Angle $EBC = 60^\circ$

Angle $DBE = 180^\circ - (90^\circ + 60^\circ) = 30^\circ$

Angle $BEC = 60^\circ$

Angle $BED = 180^\circ - 60^\circ = 120^\circ$

Angle $BDE = 180^\circ - (30^\circ + 120^\circ) = 30^\circ$

angle in a rectangle

angle in an equilateral triangle

angles on a straight line add up to 180°

angle in an equilateral triangle

angles on a straight line add up to 180°

angle sum of a triangle is 180°

So angles DBE and BDE are equal, and triangle BED is isosceles.

- 6 a Madhav should have put brackets round the 14×3 , otherwise the calculator squares only the number 3.

b $(14 \times 3)^2 = 1764$

- 7 a q is greater than p by 5

b c is greater than d by 2

- 8 It is too low because $6 \times 4 = 24$

The salmon costs more than £6 per kilogram and Niki buys more than 4 kilograms, so the cost must be more than £24.

- 9 Angle $ACB = \frac{1}{2} (180^\circ - 64^\circ) = 58^\circ$

base angle of an isosceles triangle

Angle $ACD = 180^\circ - 58^\circ = 122^\circ$

angles on a straight line add up to 180°

So $x = 122^\circ \div 2 = 61^\circ$

If angles BAC and ACE were equal, AB and CE would be parallel using alternate angles.

But the angles are not equal, so AB and CE are not parallel.

- 10 The multiples of 4 are all even numbers (4, 8, 12, 16, ...) and all numbers ending in '3' are odd, so a number ending in '3' cannot be a multiple of 4.

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11 No, Josh is not correct.

The ratio says 1 boy for every 3 girls. This means 1 boy for every 4 members.

So one-quarter of the members are boys.

12 a The mean will decrease because the age of the new member is less than the original mean.

b The range cannot decrease because the difference between the lowest and highest ages cannot get smaller. It is not possible to tell whether the range will increase or stay the same, because it depends whether the age of the new member is lower than the lowest age already in the club.

13 The perimeter of the square = 16 cm.

$$\text{So } 2 \times \pi \times r = 16$$

$$\pi \times r = 8$$

$$r = \frac{8}{\pi} = 2.55 \text{ cm (3 s.f.)}$$

$$\mathbf{14} \quad 3^2 + 2^3 = 9 + 8 = 17$$

$$(3^2)^2 - 4^3 = 9^2 - 64 = 81 - 64 = 17$$

$$\text{So } 3^2 + 2^3 = (3^2)^2 - 4^3$$

$$\mathbf{15} \text{ Let } 6y - 4 = 2(2y + 3)$$

$$6y - 4 = 4y + 6$$

$$6y - 4y = 6 + 4$$

$$2y = 10$$

$$y = 5$$

$$\mathbf{16} \text{ Let } p = 3 \text{ and } q = 4, \text{ so } \frac{1}{p} + \frac{1}{q} = \frac{1}{3} + \frac{1}{4}$$

The common denominator for 3 and 4 is 12 (3×4 not $3 + 4$).

$$\text{So } \frac{1}{3} + \frac{1}{4} = \frac{4+3}{12} = \frac{7}{12} \text{ and } \frac{1}{p} + \frac{1}{q} = \frac{q+p}{pq} \text{ not } \frac{1}{p+q}$$