Weekly check: Year 9 whole year

Worked solutions

KS3 Maths weekly check

This check online

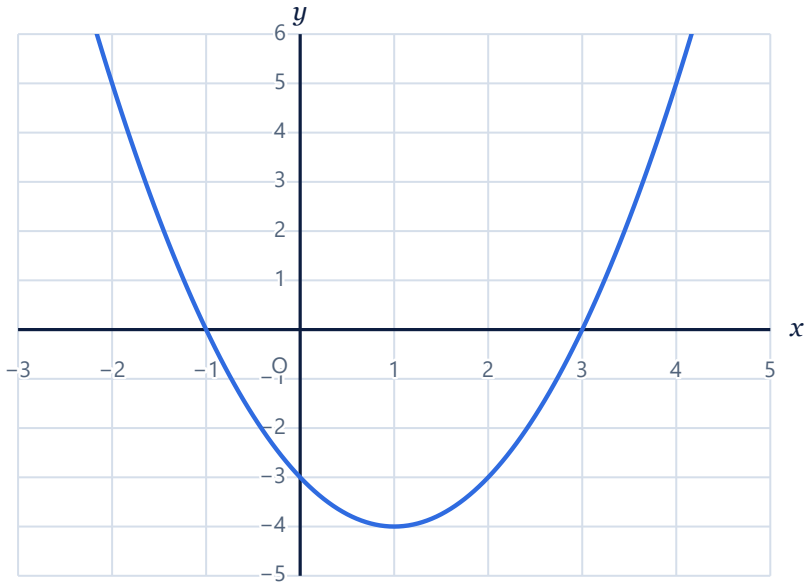
Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

1 The diagram shows the graph of $y = x^2 - 2x - 3$

a. Write down the coordinates of the point where the graph crosses the y-axis.

b. Write down the solutions of $x^2 - 2x - 3 = 0$

c. Write down the coordinates of the turning point of the graph.



(3 marks)

a)

Crosses the y-axis where $x = 0$

$y = 0^2 - 2 \times 0 - 3$

$y = -3$

$(0, -3)$

b)

Where the curve crosses the x-axis

$x = -1$

$x = 3$

c)

Halfway between the roots

$$x = \frac{-1 + 3}{2}$$

$x = 1$

$y = 1^2 - 2 \times 1 - 3$

$y = -4$

$(1, -4)$

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

2 At the school tuck shop:

2 cookies and 1 drink cost £2.30

1 cookie and 1 drink cost £1.60

Work out the cost of one cookie and the cost of one drink. (3 marks)

Work in pence

$2c + d = 230$

$c + d = 160$

Subtract the equations

$c = 70$

$70 + d = 160$

$-70 \qquad d = 90 \qquad -70$

Check: 140 + 90 = 230

Cookie 70p, drink 90p

3 5 miles is about 8 kilometres.

a. A school fun run is 12 km long. Work out about how many miles this is.

b. A road sign says London is 25 miles away. Work out about how many kilometres this is. (2 marks)

a)

$12 \div 8 = 1.5$

$1.5 \times 5 = 7.5$

7.5 miles

b)

$25 \div 5 = 5$

$5 \times 8 = 40$

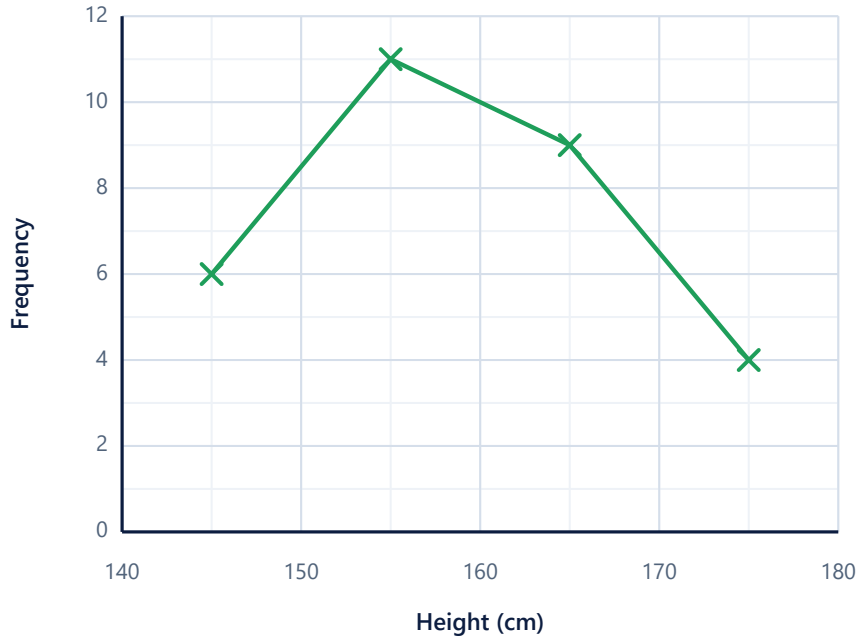
40 km

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

4 The table shows the heights, in centimetres, of 30 students.

Height (h cm)	Frequency
$140 < h \leq 150$	6
$150 < h \leq 160$	11
$160 < h \leq 170$	9
$170 < h \leq 180$	4

Draw a frequency polygon for this information.



(2 marks)

Find the midpoint of each class

$$\frac{140 + 150}{2} = 145$$

$$\frac{150 + 160}{2} = 155$$

$$\frac{160 + 170}{2} = 165$$

$$\frac{170 + 180}{2} = 175$$

Plot (midpoint, frequency)

(145, 6) (155, 11) (165, 9) (175, 4)

Join with straight lines

Do not join last point to first

Points (145, 6), (155, 11), (165, 9), (175, 4) joined

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

5 A trapezium has parallel sides of length 8 cm and 14 cm.

The area of the trapezium is 66 cm^2.

Work out the perpendicular height of the trapezium. (2 marks)

$$\text{Area} = \frac{(a+b)}{2} \times h$$

$$\frac{8+14}{2} \times h = 66$$

$$11h = 66$$

$$\div 11 \qquad h = 6 \qquad \div 11$$

6 cm

6 The diagram shows a right-angled triangle.

Work out the length x.

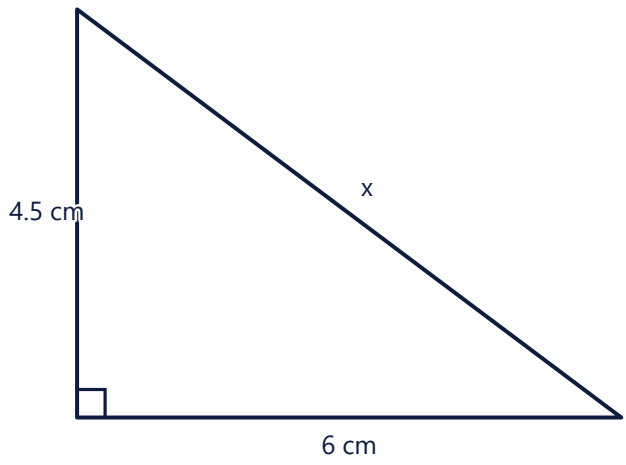


Diagram NOT accurately drawn

(2 marks)

$$x^2 = 4.5^2 + 6^2$$

$$x^2 = 20.25 + 36$$

$$x^2 = 56.25$$

$$\sqrt{\quad} \qquad x = \sqrt{56.25} \qquad \sqrt{\quad}$$

$$x = 7.5$$

7.5 cm

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

7 a. Write each of these in the correct algebraic way.

(i) $a \times 4 \times b$ (ii) $m \div 3$ (iii) $y \times y \times 5$

b. Simplify $5p + 3q - 2p + q$

(3 marks)

a) Number first, no × signs

(i)

$4ab$

(ii)

$\frac{m}{3}$

(iii)

$5y^2$

b) Collect like terms

$5p - 2p = 3p$

$3q + q = 4q$

$3p + 4q$

8 A straight line has gradient -2 and passes through the point (3, 1).

Find the equation of the line.

(3 marks)

$y = -2x + c$

Substitute (3, 1)

$1 = -2 \times 3 + c$

$1 = -6 + c$

+6 $c = 7$ +6

$y = -2x + 7$

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

9 a. Write 8^2 as a power of 2.

b. Write $4^3 \times 2^5$ as a single power of 2.

c. Write $9^4 \div 27$ as a single power of 3.

(4 marks)

a) $8 = 2^3$

$8^2 = (2^3)^2$

$(2^3)^2 = 2^6$

$\boxed{2^6}$

b) $4 = 2^2$

$4^3 = (2^2)^3$

$= 2^6$

$2^6 \times 2^5 = 2^{11}$

$\boxed{2^{11}}$

c) $9 = 3^2$ and $27 = 3^3$

$9^4 = (3^2)^4$

$= 3^8$

$3^8 \div 3^3 = 3^5$

$\boxed{3^5}$

10 Solve $3(x + 4) = 27$

(2 marks)

$3(x + 4) = 27$

$\div 3$: $x + 4 = 9$

-4 : $x = 5$

$\boxed{x = 5}$

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

11 Work out $\frac{4}{9} \times \frac{3}{10}$

Give your answer as a fraction in its simplest form. (2 marks)

Multiply tops, multiply bottoms

$$\frac{4}{9} \times \frac{3}{10} = \frac{4 \times 3}{9 \times 10}$$

$$\frac{4}{9} \times \frac{3}{10} = \frac{12}{90}$$

Divide top and bottom by 6

$$\frac{12}{90} = \frac{2}{15}$$

$\boxed{\frac{2}{15}}$

12 A taxi charges £4 plus £2 for every mile.

Leo has £15. He travels m miles.

a. Write an inequality in m to show that Leo cannot spend more than £15.

b. Solve your inequality to find the greatest whole number of miles Leo can travel. (3 marks)

a) £4 plus £2 for each of m miles

$\boxed{4 + 2m \leq 15}$

b)

$$\begin{array}{lrcll} & 4 + 2m & \leq & 15 & \\ -4 & 2m & \leq & 11 & -4 \\ \div 2 & m & \leq & 5.5 & \div 2 \end{array}$$

greatest whole number up to 5.5

$\boxed{5 \text{ miles}}$

13 Triangle A has vertices at (1, 1), (3, 1) and (1, 4).

Triangle B has vertices at (5, −1), (7, −1) and (5, 2).

Describe fully the single transformation that maps triangle A onto triangle B. (2 marks)

Compare matching vertices

(1, 1) → (5, −1): +4 in x, −2 in y

(3, 1) → (7, −1): +4 in x, −2 in y

(1, 4) → (5, 2): +4 in x, −2 in y

Same size, same way up

$\boxed{\text{Translation by the vector } (4, -2)}$

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

14 The price of a jacket is reduced by 10%.

The reduced price is £63.

Work out the price of the jacket before the reduction. (2 marks)

$100\% - 10\% = 90\%$

£63 is 90%

$10\% = 63 \div 9$

$10\% = 7$

$100\% = 7 \times 10$

$100\% = 70$

Check

$70 \times 0.9 = 63$

£70

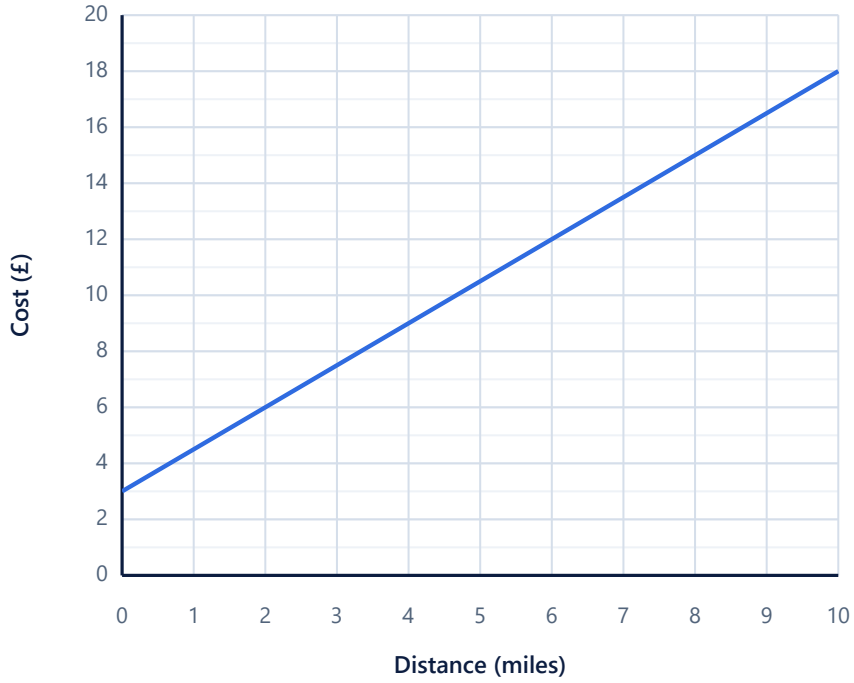
15 A taxi company shows its fares on a graph of cost against distance.

The graph is a straight line through (0, 3) and (10, 18), where cost is in pounds and distance is in miles.

a. Write down the fixed charge for any journey.

b. Work out the cost per mile.

c. Work out the fare for a journey of 6 miles.



(3 marks)

a)

Cost when distance = 0

Line crosses the cost axis at 3

£3

b)

$$\text{Gradient} = \frac{18 - 3}{10 - 0}$$

$$\text{Gradient} = \frac{15}{10}$$

$$\text{Gradient} = 1.5$$

£1.50 per mile

c)

$$\text{Fare} = 3 + 6 \times 1.50$$

$$\text{Fare} = 3 + 9$$

$$\text{Fare} = 12$$

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

£12

16 The passcode for a tablet is a 4 digit number.

The first digit cannot be 0.

Digits may repeat.

a. Work out the number of different passcodes that are possible.

b. Ruby does not know the passcode. She types one 4 digit number at random, with a non-zero first digit. Write down the probability that Ruby types the correct passcode.

(3 marks)

a)

first digit: 1 to 9, so 9 choices

other digits: 0 to 9, so 10 choices

$9 \times 10 \times 10 \times 10 = 9000$

9000

b)

1 correct code out of 9000

$P(\text{correct}) = \frac{1}{9000}$

$\frac{1}{9000}$

17 a. There are 32 pupils in a Year 9 class. 12 of them walk to school. What fraction of the class walk to school? Give your answer in its simplest form.

b. Write 40 minutes as a fraction of 2 hours. Give your answer in its simplest form.

(2 marks)

a)

$\frac{12}{32} = \frac{3}{8}$

$\frac{3}{8}$

b)

same units first

2 hours = 120 minutes

$\frac{40}{120} = \frac{1}{3}$

$\frac{1}{3}$

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

18 Meera says

"Every multiple of 5 ends in the digit 5."

Give an example to show that Meera is wrong.

(2 marks)

Multiples of 5

5, 10, 15, 20, ...

2 × 5 = 10

10 ends in 0, not 5

10 is a multiple of 5 ending in 0

19 A number y is 0.08, correct to 1 significant figure.

Complete the error interval for y.

..... ≤ y < .....

(2 marks)

1 sf of 0.08 is the nearest 0.01

Half of 0.01 is 0.005

Lower bound = 0.08 − 0.005

Lower bound = 0.075

Upper bound = 0.08 + 0.005

Upper bound = 0.085

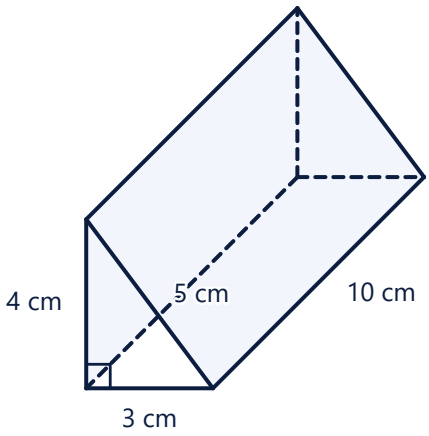
$0.075 \leq y < 0.085$

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

20 The cross-section of a triangular prism is a right-angled triangle with base 3 cm, height 4 cm and hypotenuse 5 cm.

The length of the prism is 10 cm.

Work out the total surface area of the prism.



(3 marks)

Two triangle ends

$$A = \frac{1}{2} \times b \times h$$

$$A = \frac{1}{2} \times 3 \times 4$$

$$A = 6$$

$$2 \times 6 = 12$$

Three rectangles

$$3 \times 10 = 30$$

$$4 \times 10 = 40$$

$$5 \times 10 = 50$$

Add all the faces

$$SA = 12 + 30 + 40 + 50$$

$$SA = 132$$

$132\ cm^2$

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.