Weekly check: Year 8 part 2

Worked solutions

KS3 Maths weekly check

This check online

1 A straight line passes through the points (1, 7) and (3, 13).

Find the equation of the line.

Give your answer in the form $y = mx + c$

(3 marks)

Gradient

change in y = 13 − 7

= 6

change in x = 3 − 1

= 2

$m = \frac{\text{change in } y}{\text{change in } x}$

$m = \frac{6}{2}$

$m = 3$

Substitute (1, 7) into $y = 3x + c$

$7 = 3 \times 1 + c$

$7 = 3 + c$

−3 $c = 4$ −3

Check with (3, 13)

$3 \times 3 + 4 = 13$

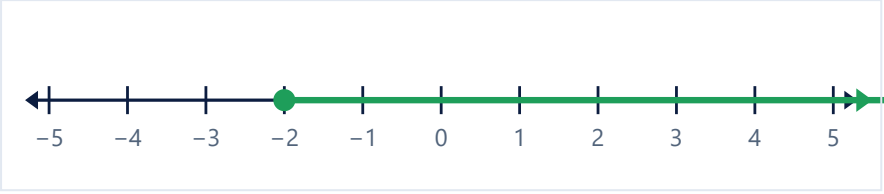
$y = 3x + 4$

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

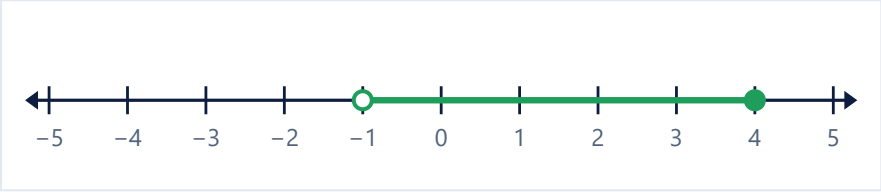
2 Show each inequality on its number line.

a. $x \geq -2$

b. $-1 < x \leq 4$



a



b

(2 marks)

Solid circle = included (≤ or ≥), open circle = not included (< or >)

a)

Solid circle at -2

Arrow to the right

Solid circle at -2, arrow right

b)

Open circle at -1

Solid circle at 4

Join them

Open circle at -1 to solid circle at 4

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

3 A model of a car is made to a scale of 1 : 24.

a. The model is 18 cm long. Work out the length of the real car in metres.

b. The real car is 1.44 m high. Work out the height of the model in centimetres.

(3 marks)

Real = 24 x model

a)

18 x 24 = 432 cm

432 ÷ 100 = 4.32

4.32 m

b)

1.44 m = 144 cm

144 ÷ 24 = 6

6 cm

4 The diagram shows two parallel lines crossed by a straight line.

One of the marked angles is 71°. The angle marked x° is the co-interior angle between the parallel lines on the same side of the crossing line.

Work out the value of x. Give a reason for your answer.

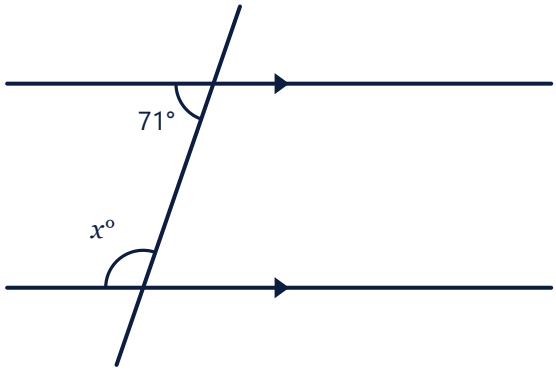


Diagram NOT accurately drawn

(3 marks)

Co-interior angles add to 180°

$x + 71 = 180$

$-71 \quad x = 109 \quad -71$

$x = 109$

Co-interior angles add up to 180°

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

5 A pattern of shapes tessellates if the shapes fit together around every point with no gaps and no overlaps.

a. Explain why regular hexagons tessellate.

b. Explain why regular pentagons do not tessellate.

c. Ella makes a floor tile pattern where two regular octagons and one square meet at every point. Show that this pattern has no gaps.

(3 marks)

a) hexagon

$360 \div 6 = 60$

$180 - 60 = 120$

$3 \times 120 = 360$

3 hexagons make 360° exactly

b) pentagon

$360 \div 5 = 72$

$180 - 72 = 108$

$3 \times 108 = 324$

$4 \times 108 = 432$

324° leaves a gap, 432° overlaps

c) octagon angle = 135°, square = 90°

$135 + 135 + 90 = 360$

360° so no gaps

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

6 Here are the first four terms of an arithmetic sequence.

7 12 17 22

Explain why 81 is not a term of this sequence. (2 marks)

7, 12, 17, 22, 27, 32, ...

Terms go up in 5s

Every term ends in 2 or 7

81 ends in 1

Or use the nth term 5n + 2

$$\begin{array}{lrcll} & 5n + 2 & = & 81 & \\ -2 & 5n & = & 79 & -2 \\ \div 5 & n & = & 15.8 & \div 5 \end{array}$$

15.8 is not a whole number

Every term ends in 2 or 7, and 81 ends in 1

7 A is the point with coordinates (2, 4).

B is the point with coordinates (8, 10).

Work out the coordinates of the midpoint of AB. (2 marks)

Midpoint: mean of each coordinate

$$x = \frac{2 + 8}{2}$$

$$x = \frac{10}{2}$$

$$x = 5$$

$$y = \frac{4 + 10}{2}$$

$$y = \frac{14}{2}$$

$$y = 7$$

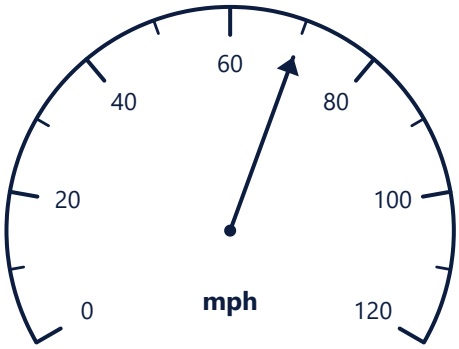
(5, 7)

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

8 The diagram shows the speedometer of a car.

a. Write down the speed shown on the speedometer.

b. Use 5 miles = 8 kilometres to change this speed to km/h.



(3 marks)

a) Each small mark = 10 mph

Halfway between 60 and 80

70 mph

b)

70 ÷ 5 = 14

14 x 8 = 112

112 km/h

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

9 The diagram shows an inequality on a number line.

Write down the inequality shown, using x.



(2 marks)

Solid circle at -1: included

$x \geqslant -1$

Open circle at 4: not included

$x < 4$

Put them together

$\boxed{-1 \leqslant x < 4}$

10 The diagrams show a triangle and a quadrilateral.

a. Work out the size of angle x.

b. Work out the size of angle y.

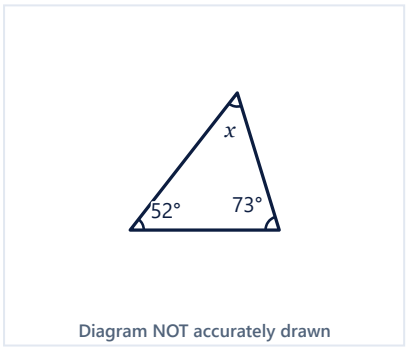


Diagram NOT accurately drawn

a

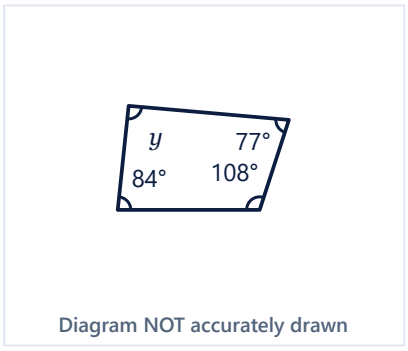


Diagram NOT accurately drawn

b

(2 marks)

a) angles in a triangle add to 180°

$52 + 73 = 125$

$x = 180 - 125$

$\boxed{x = 55^\circ}$

b) angles in a quadrilateral add to 360°

$84 + 108 + 77 = 269$

$y = 360 - 269$

$\boxed{y = 91^\circ}$

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

11 DE and FG are parallel straight lines.

Triangle ABC is drawn so that A lies on DE, and B and C both lie on FG.

D is to the left of A and E is to the right of A.

Angle DAB = 48° and angle ACB = 63°.

Work out the size of angle BAC.

Give a reason for each stage of your working.

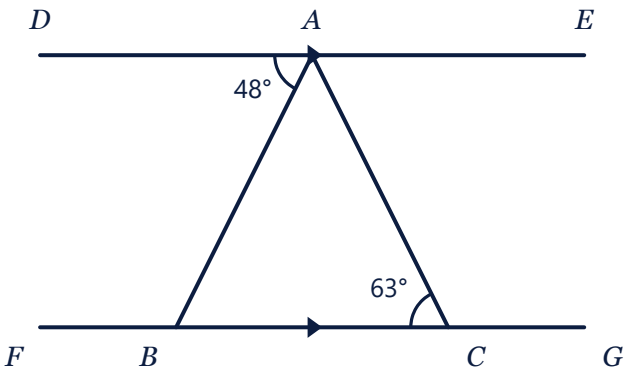


Diagram NOT accurately drawn

(4 marks)

$ABC = DAB$

$ABC = 48^\circ$

Alternate angles are equal

$BAC = 180^\circ - 48^\circ - 63^\circ$

$BAC = 69^\circ$

Angles in a triangle add to 180°

$\boxed{69^\circ}$

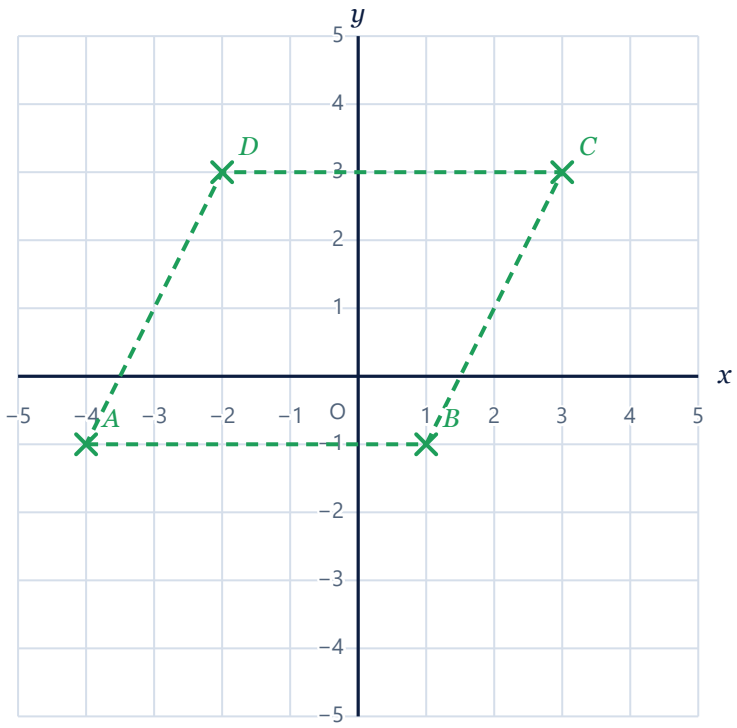
Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

12 A, B and C are three vertices of a parallelogram ABCD.

A is (−4, −1), B is (1, −1) and C is (3, 3).

a. On the grid, plot the points A, B and C.

b. Work out the coordinates of D.



(3 marks)

a)

A (−4, −1), B (1, −1), C (3, 3)

A, B and C plotted

b)

DC is parallel to AB and the same length

A to B: 5 right, 0 up

so D to C: 5 right, 0 up

D = (3 − 5, 3 − 0)

D (−2, 3)

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

13 Simplify

a. $5a^2 + 3a - 2a^2 + 4a - 9$

b. $4xy - 7 + 2yx + 10$

(2 marks)

a)

a^2 terms: $5a^2 - 2a^2 = 3a^2$

a terms: $3a + 4a = 7a$

$\boxed{3a^2 + 7a - 9}$

b)

yx is the same as xy

$4xy + 2xy = 6xy$

$-7 + 10 = 3$

$\boxed{6xy + 3}$

14 Two angles fit together on a straight line. One of the angles is 64° and the other angle is y°.

a. Work out the value of y.

b. Give a reason for your answer.

(2 marks)

a)

$y + 64 = 180$ (−64)

$y = 116$

$\boxed{y = 116}$

b)

$\boxed{\text{Angles on a straight line add up to } 180^\circ}$

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

15 Here are four pieces of algebra.

A: $3x + 2 = 11$ B: $A = lw$ C: $4y - 7$ D: $2(x + 3) \equiv 2x + 6$

Write down which one is

a. an expression

b. an equation

c. a formula

d. an identity

(2 marks)

a)

expression: no equals sign

C

b)

equation: true for one value ($x = 3$)

A

c)

formula: works out one quantity from others

B

d)

identity: true for every x, the $\equiv$ sign

D

16 Here are the first four terms of an arithmetic sequence.

5 9 13 17

Find an expression, in terms of n, for the nth term of the sequence.

(2 marks)

5, 9, 13, 17

Common difference = +4

4n: 4, 8, 12, 16

Each term is 1 more than 4n

nth term = 4n + 1

Check n = 3

4 x 3 + 1 = 13

4n + 1

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

17 Solve $\frac{w}{4} + 2 = 9$ (2 marks)

$\frac{w}{4} + 2 = 9$

$-2 \quad -2$

$\frac{w}{4} = 7$

$\times 4 \quad \times 4$

$w = 28$

$w = 28$

18 Dan and Ella share 45 sweets.

Ella gets 7 more sweets than Dan.

Dan says, "I got 20 sweets."

Is Dan right? You must show how you get your answer. (3 marks)

Dan = d, Ella = d + 7

$d + d + 7 = 45$

$2d + 7 = 45$

$-7 \quad -7$

$2d = 38$

$\div 2 \quad \div 2$

$d = 19$

Check

$19 + 26 = 45$

No, Dan got 19 sweets, not 20

19 A straight line has equation $y = 3x - 2$

a. Write down the gradient of the line.

b. Write down the coordinates of the point where the line crosses the y-axis. (2 marks)

Compare with $y = mx + c$

$y = 3x - 2$

a)

$m = 3$

3

b)

$c = -2$

Crosses the y-axis where $x = 0$

$(0, -2)$

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

20 a. The first term of a sequence is 7. The term-to-term rule is "multiply by 2 then subtract 3". Write down the first four terms.

b. The first term of another sequence is 50. The term-to-term rule is "subtract 8". Write down the first five terms.

(3 marks)

a)

$7 \times 2 - 3 = 11$

$11 \times 2 - 3 = 19$

$19 \times 2 - 3 = 35$

7, 11, 19, 35

b) - 8 each time

50, 42, 34, 26, 18

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