Weekly check: Year 9 part 2

Worked solutions

KS3 Maths weekly check

This check online

1 A bag contains 4 green counters, 7 yellow counters and 9 white counters.

A counter is taken from the bag at random.

Find the probability that the counter is **not** green.

(2 marks)

Total counters

$4 + 7 + 9 = 20$

Not green

$7 + 9 = 16$

$P(\text{not green}) = \frac{16}{20}$

$\div 4$ $P(\text{not green}) = \frac{4}{5}$ $\div 4$

$\boxed{\frac{4}{5}}$

2 Priya thinks of a number.

She multiplies the number by 4 and then subtracts 9.

Her answer is 35.

Work out the number Priya thought of.

(3 marks)

Let the number be n

$4n - 9 = 35$

$+9$ $4n = 44$ $+9$

$\div 4$ $n = 11$ $\div 4$

Check

$4 \times 11 - 9 \rightarrow 35$

$\boxed{11}$

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3 a. Solve $5 \leq 3x - 4 < 14$

b. Show your answer to part a on the number line.



(3 marks)

a)

$5 \leq 3x - 4 < 14$

+4 to all three parts

$9 \leq 3x < 18$

÷3 all three parts

$3 \leq x < 6$

$3 \leq x < 6$

b)

Filled circle at 3, open circle at 6

Joined by a line

4 Here are the first four terms of a sequence.

14 11 8 5

a. Work out the next two terms of the sequence.

b. Write down the term-to-term rule of the sequence.

(3 marks)

a)

14 → 11 → 8 → 5: down 3 each time

5 - 3 = 2

2 - 3 = -1

2 and -1

b)

Subtract 3

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5 A bistro menu has 5 starters, 8 main courses and 4 desserts.

Callum chooses one starter, one main course and one dessert.

Work out the number of different three-course meals Callum can choose.

(2 marks)

Multiply the choices at each stage

starters x mains x desserts

$5 \times 8 = 40$

$40 \times 4 = 160$

$\boxed{160}$

6 The number line shows an inequality.

a. Write down the inequality shown, using x.

b. Write down the smallest integer that satisfies the inequality.



(2 marks)

a)

Open circle, so not included

Arrow right, so greater than

$\boxed{x > -2}$

b)

-2 is not included

$\boxed{-1}$

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7

a. Simplify $t^8 \div t^3$

b. Simplify $(k^4)^5$

c. Simplify $\frac{12x^6y^3}{4x^2y}$

(3 marks)

a)

$t^8 \div t^3 = t^{8-3}$

$= t^5$

$\boxed{t^5}$

b)

$(k^4)^5 = k^{4 \times 5}$

$= k^{20}$

$\boxed{k^{20}}$

c)

$12 \div 4 = 3$

$x^6 \div x^2 = x^4$

$y^3 \div y^1 = y^2$

$\boxed{3x^4y^2}$

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8

a. Make r the subject of $C = 2\pi r$

b. Make b the subject of $P = 2(a + b)$

c. Make x the subject of $y = \frac{x + 4}{3}$

(3 marks)

a)

$C = 2\pi r$

$\div 2\pi$ $\quad \frac{C}{2\pi} = r$ $\quad \div 2\pi$

$$r = \frac{C}{2\pi}$$

b)

$P = 2(a + b)$

$\div 2$ $\quad \frac{P}{2} = a + b$ $\quad \div 2$

$-a$ $\quad \frac{P}{2} - a = b$ $\quad -a$

$$b = \frac{P}{2} - a$$

c)

$y = \frac{x + 4}{3}$

$\times 3$ $\quad 3y = x + 4$ $\quad \times 3$

-4 $\quad 3y - 4 = x$ $\quad -4$

$$x = 3y - 4$$

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9 40 students each chose one sport. 15 chose football and 6 chose tennis. Ellie is going to draw a pie chart of the results.

a. Work out the angle Ellie should use for football.

b. Work out the angle Ellie should use for tennis.

(3 marks)

Angle for one student

$360^\circ \div 40 = 9^\circ$

a)

Football $= 15 \times 9^\circ$

Football $= 135^\circ$

135°

b)

Tennis $= 6 \times 9^\circ$

Tennis $= 54^\circ$

54°

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10 The diagram shows a trapezium.

a. Work out the area of the trapezium.

b. Work out the perimeter of the trapezium.



Diagram NOT accurately drawn

(3 marks)

a)

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

$$\text{Area} = \frac{9 + 12}{2} \times 4$$

$$\text{Area} = 10.5 \times 4$$

$$\text{Area} = 42 \text{ cm}^2$$

$\boxed{42 \text{ cm}^2}$

b)

Add all four sides

$$\text{Perimeter} = 12 + 5 + 9 + 4$$

$$\text{Perimeter} = 30 \text{ cm}$$

$\boxed{30 \text{ cm}}$

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11 a. The nth term of a sequence is $20 - 3n$
Write down the first three terms and work out the 10th term.

b. The nth term of another sequence is $n^2 + 2$
Write down the first three terms.

(3 marks)

a)

$n = 1$: $20 - 3 \times 1 = 17$

$n = 2$: $20 - 3 \times 2 = 14$

$n = 3$: $20 - 3 \times 3 = 11$

$n = 10$: $20 - 3 \times 10 = -10$

17, 14, 11 and -10

b)

$n = 1$: $1^2 + 2 = 3$

$n = 2$: $2^2 + 2 = 6$

$n = 3$: $3^2 + 2 = 11$

3, 6, 11

12 Make k the subject of the formula

$m = \frac{k}{5} - 2$

(2 marks)

$m = \frac{k}{5} - 2$

$+2$: $m + 2 = \frac{k}{5}$: $+2$

$\times 5$: $5(m + 2) = k$: $\times 5$

$k = 5(m + 2)$

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13 On the number line, show the inequality $-1 < x \leq 3$



(2 marks)

< means not included: open circle

Open circle at -1

≤ means included: filled circle

Filled circle at 3

Join them with a line

Open circle at -1, filled circle at 3, joined

14 Choose the most suitable diagram for each set of data from this list.

pie chart scatter graph time series graph frequency polygon

a. The temperature in a classroom, taken every hour during a school day.

b. The height and the arm span of each of 20 pupils.

c. The favourite crisp flavours of Year 9, to show what proportion chose each flavour.

d. The finishing times of 60 runners in a fun run, grouped into classes.

(2 marks)

a) values over time

time series graph

b) two measurements for each pupil

scatter graph

c) parts of a whole

pie chart

d) grouped data

frequency polygon

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15 a. In science, the distance s metres travelled by a cart is given by

$s = ut + \frac{1}{2}at^2$

Work out s when $u = 3$, $t = 4$ and $a = 2.5$

b. To change a temperature from °C to °F you can use $F = \frac{9C}{5} + 32$

Ruby's thermometer reads 25 °C. Change this temperature to °F.

(3 marks)

a)

$s = 3 \times 4 + \frac{1}{2} \times 2.5 \times 4^2$

$s = 12 + \frac{1}{2} \times 2.5 \times 16$

$s = 12 + 20$

$s = 32$

32 m

b)

$F = \frac{9 \times 25}{5} + 32$

$F = \frac{225}{5} + 32$

$F = 45 + 32$

$F = 77$

77 °F

16 Expand and simplify $(x + 2)(x + 3)(x + 4)$

(3 marks)

Expand the first two brackets

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

$(x + 2)(x + 3) = x^2 + 5x + 6$

Multiply by the third bracket

$(x^2 + 5x + 6)(x + 4)$

$x^3 + 4x^2 + 5x^2 + 20x + 6x + 24$

Collect like terms

$x^3 + 9x^2 + 26x + 24$

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17 a. A rectangular noticeboard has an area of 84 cm^2 and a length of 12 cm. Work out the width of the noticeboard.

b. A triangle has an area of 36 cm^2 and a base of 9 cm. Work out the perpendicular height of the triangle.

(3 marks)

a)

$12 \times w = 84$

$\div 12$ $\quad w = 7$ $\quad \div 12$

7 cm

b)

$\frac{1}{2} \times 9 \times h = 36$

$4.5h = 36$

$\div 4.5$ $\quad h = 8$ $\quad \div 4.5$

8 cm

18 A circle has radius 6 cm.

a. Work out the circumference of the circle. Give your answer correct to 1 decimal place.

b. Work out the area of the circle. Give your answer correct to 1 decimal place.

(3 marks)

a)

$C = 2\pi r$

$C = 2 \times \pi \times 6$

$C = 37.6991...$

Round to 1 dp

37.7 cm

b)

$A = \pi r^2$

$A = \pi \times 6^2$

$A = 113.0973...$

Round to 1 dp

113.1 cm^2

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19 a. Write down the inverse of each operation.
(i) add 7 (ii) multiply by 4 (iii) divide by 3

b. Mia thinks of a number. She multiplies it by 3 and then adds 8. Her answer is 29.
Use inverse operations to work out Mia's number.

(3 marks)

a)

(i)

subtract 7

(ii)

divide by 4

(iii)

multiply by 3

b)

Work backwards, undo the last step first

$29 - 8 = 21$

$21 \div 3 = 7$

7

20 Ollie buys 4 cinema tickets and one large popcorn.
Each ticket costs £*t*. The popcorn costs £6.
He pays £38 altogether.

a. Write an equation in *t*.

b. Solve your equation to find the cost of one ticket.

(3 marks)

a) 4 tickets at £t plus £6

$4t + 6 = 38$

b)

$4t + 6 = 38$

$-6 \quad 4t = 32 \quad -6$

$\div 4 \quad t = 8 \quad \div 4$

£8

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