

W/C: 14/05/18

Name.....

Teacher.....

Assessment Week

H

Year 10 Higher Tier Maths GCSE

Non-Calculator Paper

Time allowed: 1 Hour

Maximum mark: 54

1 Work out $\sqrt{2^6 + 6^2} = \sqrt{64 + 36} = \sqrt{100} = 10$
 Circle your answer. [1 mark]

$2^6 = 64$ $6^2 = 36$

$\sqrt{64 + 36} = \sqrt{100} = 10$

(10) 14 50 100

2 What is 800 million in standard form? Circle your answer. [1 mark]

800 000 000 8 PLACES

$8 \cdot 0 \times 10^8$

800×10^6 8×10^8 8×10^9 0.8×10^{10}

3 Circle the expression that is equivalent to $(4a^5)^2 = 4^2 \times (a^5)^2 = 16a^{10}$ [1 mark]

$16a^{10}$ $16a^7$ $8a^{10}$ $8a^7$

4 $y = \frac{10}{x}$ $y =$
 If the value of x doubles, what happens to the value of y?
 Circle your answer. [1 mark]

(+2) $\times 2$ +5 $\times 5$

5 (a) Factorise $x^2 - 100 = (x + 10)(x - 10)$ [1 mark]

DIFFERENCE OF TWO SQUARES

Answer $(x + 10)(x - 10)$

5 (b) Solve $7x + 6 > 1 + 2x$ [2 marks]

$$\begin{array}{r} 7x + 6 > 1 + 2x \\ -2x \quad -2x \\ \hline 5x + 6 > 1 \\ -6 \quad -6 \\ \hline \end{array}$$

$$\begin{array}{r} 5x > -5 \div 5 \\ \div 5 \\ \hline x > -1 \end{array}$$

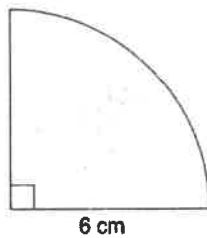
Answer $x > -1$

6 Work out the value of $(\sqrt{3})^2 \times (\sqrt{2})^2$ [2 marks]

$$= 3 \times 2 = 6$$

Answer 6

7 Here is a quarter circle of radius 6 cm



Not drawn accurately

$$A = \frac{\pi r^2}{4}$$

Work out the area of the quarter circle.

Give your answer in terms of π .

[2 marks]

$$A = \frac{\pi \times 6^2}{4} = \frac{36\pi}{4} = 9\pi$$

Answer 9π cm²

8 Three whole numbers are each rounded to the nearest 10
The sum of the rounded numbers is 70

Work out the maximum possible sum for the original three numbers.

[2 marks]

$$\begin{array}{l} \text{eg } 70 = 10 + 30 + 30 \\ 10 \text{ COULD HAVE BEEN } 14 \text{ ROUNDED DOWN} \\ 30 \quad " \quad " \quad " \quad " \quad " \quad " \\ 30 \quad " \quad " \quad " \quad " \quad " \quad " \\ \hline \text{SO MAX} = 14 + 34 + 34 = 82 \end{array}$$

Answer 82

9 Circle the expression for the range of n consecutive integers.

[1 mark]

$$\frac{n+1}{2} \quad n-1 \quad n \quad n+1$$

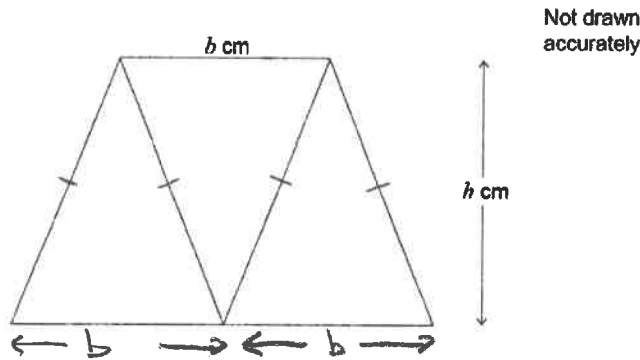
RANGE = BIGGEST - SMALLEST

SO STARTING AT 1 ... TO ... n

RANGE = n - 1

10

Three identical isosceles triangles are joined to make this trapezium.
Each triangle has base b cm and perpendicular height h cm



10 (a) Work out an expression, in terms of b and h , for the area of the trapezium.
Give your answer in its simplest form.

[2 marks]

$$\begin{aligned} \text{AREA} &= \frac{1}{2} \times (\text{base} + \text{top}) \times \text{height} \\ &= \frac{(b + 2b) \times h}{2} = \frac{3bh}{2} \end{aligned}$$

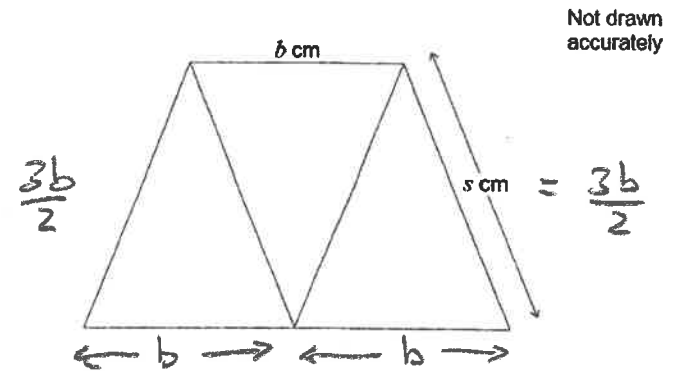
Answer $\frac{3bh}{2}$ cm²

or $1\frac{1}{2}bh$

or $1.5bh$

10 (b)

This diagram shows the same trapezium.



$b : s = 2 : 3$

Work out an expression, in terms of b , for the perimeter of the trapezium.

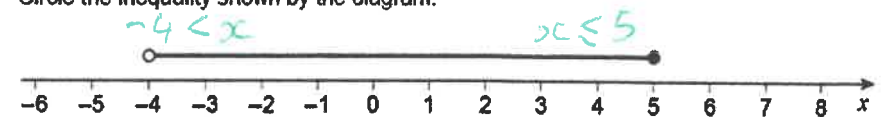
[2 marks]

$$\begin{aligned} b : s &= 2 : 3 & \frac{b}{2} &= \frac{s}{3} & \text{so } s &= \frac{3b}{2} \\ \text{Total Perimeter} &= b + 2b + \frac{3b}{2} + \frac{3b}{2} \\ &= 3b + 3b = 6b \end{aligned}$$

Answer $6b$ cm

11

Circle the inequality shown by the diagram.



[1 mark]

- $-4 < x < 5$ $-4 < x \leq 5$ $-4 < x < 5$ $-4 < x \leq 5$

12

Use approximations to 1 significant figure to estimate the value of

$$\frac{0.526 \times 39.6^2}{\sqrt{97.65}}$$

 0.526 rounds to 0.5

You must show your working.

[3 marks]

$$32.6^2 \rightarrow 3 \times 2.6^2 \text{ rounds to } 40^2 = 1600$$

$$\sqrt{97.65} \text{ rounds to } \sqrt{100} = 10$$

$$\text{So } \frac{0.5 \times 1600}{10} = \frac{800}{10} = 80$$

Answer

80

13

$x : y = 7 : 4$

$x + y = 88$

Work out the value of $x - y$

[3 marks]

$x : y$

$7 : 4$

$7 + 4 = 11$

$x + y = 88 \rightarrow \times 8$

$7 : 4 \rightarrow \times 8$

$56 : 32$

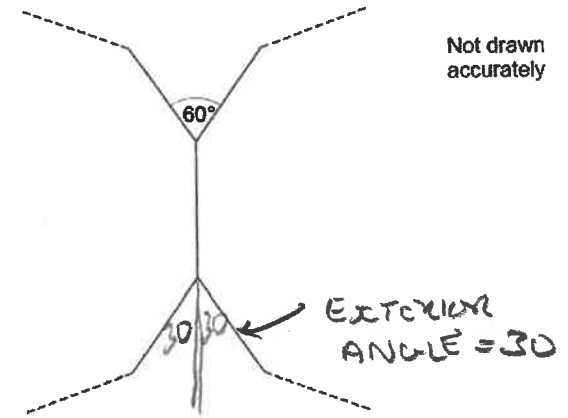
$56 - 32 = 24$

Answer

24

14

Two congruent regular polygons are joined together.



Work out the number of sides on each polygon.

[3 marks]

NUMBER OF SIDES

$= 360^\circ \div \text{EXTERIOR ANGLE}$

$360 \div 30 = 36 \div 3 = 12$

12 SIDES

Answer

12

15

y is 100% more than x.

Circle the ratio $x : y$

$100 : 200 = 1 : 2$

[1 mark]

1 : 100

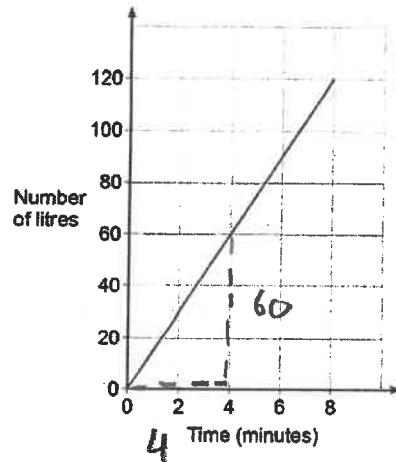
100 : 1

1 : 2

2 : 1

16

Water is poured into a tank.
The graph shows the number of litres of water in the tank.



$$\frac{15}{4 \overline{)60}}$$

$$\text{RATE} = \frac{60}{4} = 15$$

How much water is poured into the tank each minute?
Circle your answer.

1.5 litres

15 litres

30 litres

120 litres

[1 mark]

17

A and B are similar solids.

Solid	length (cm)
A	l
B	$2l$

Alex says,

"The volume of B is double the volume of A
because the length of B is double the length of A."

Is he correct?

Tick a box.

Yes

No

Give a reason for your answer.

[1 mark]

LINEAR SCALE FACTOR = 2

VOLUME SCALE FACTOR = $2^3 = 8$

18

Circle the two roots of $(2x+3)(5x-2) = 0$

$$2x+3=0$$

$$2x = -3$$

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

$$5x-2=0$$

$$5x = 2$$

$$x = \frac{2}{5}$$

[1 mark]

$\frac{3}{2}$

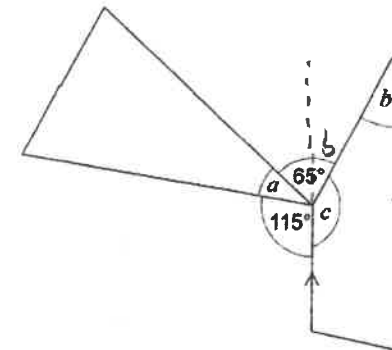
$\frac{2}{5}$

$\frac{2}{5}$

$\frac{3}{2}$

19

The diagram shows a triangle and a trapezium.



Not drawn accurately

$$\frac{115}{65}{\overline{)180}}$$

Prove that $a = b$

[3 marks]

$$a + 65 + 115 + c = 360$$

$$a + 180 + c = 360$$

$$\textcircled{1} \quad a + c = 180$$

$$\textcircled{2} \quad \text{AND } b + c = 180 \quad (\text{ALTERNATE ANGLES})$$

$$\text{SO } c = 180 - b \quad \text{SUBSTITUTE INTO } \textcircled{1}$$

$$a + c = 180$$

$$a + 180 - b = 180$$

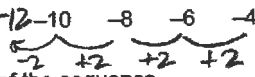
$$-180 + b \quad -180 + b$$

$$a = b$$



20

The first four terms of a sequence are -12, -10, -8, -6, -4



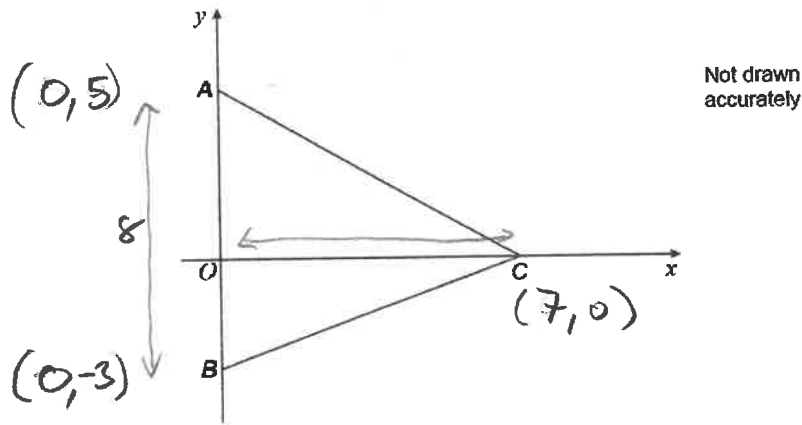
Circle the expression for the n th term of the sequence.

- $-12 - 2n$ $-8 - 2n$ $n + 2$ $2n - 12$

[1 mark]

21

A, B and C are points on the axes as shown.



The area of triangle ABC is 28 square units.

Work out possible coordinates for A, B and C.

[2 marks]

$$\text{AREA OF TRIANGLE} = \frac{1}{2} \times \text{base} \times \text{height} = 28$$

$$\text{BASE} \times \text{HEIGHT} = 56 = 8 \times 7$$

PICK COORDINATES TO GIVE BASE 8
AND HEIGHT 7

$$\begin{array}{r} 28 \\ \times 2 \\ \hline 56 \end{array}$$

eg A(0, 5) B(0, -3) C(7, 0)

22

Circle the equation of the line that is parallel to the x-axis.

[1 mark]

- $y = -5$ $x - y = 0$ $x = 3$ $x + y = 0$

23

The equation of a curve is $y = (x + 3)^2 + 5$

Circle the coordinates of the turning point.

[1 mark]

- $(5, 3)$ $(5, -3)$ $(3, 5)$ $(-3, 5)$

24

Multiply out and simplify $(x - 8)^2$

[2 marks]

$$\begin{array}{l} (x - 8)(x - 8) \\ \hline x^2 - 8x - 8x + 64 \\ \hline \hline \hline \end{array}$$

Answer $x^2 - 16x + 64$

25

15 machines work at the same rate.

Together, the 15 machines can complete an order in 8 hours.

3 of the machines break down after working for 6 hours.

The other machines carry on working until the order is complete.

In total, how many hours does each of the other machines work?

$$\begin{array}{r} 15 \\ \times 8 \\ \hline 120 \end{array}$$

[3 marks]

$$\text{TOTAL TIME TAKEN} = 8 \times 15 = 120 \text{ HOURS}$$

$$\begin{array}{l} 3 \text{ MACHINES STOP AFTER 6 HOURS SO THEIR TIME} \\ = 3 \times 6 = 18 \text{ HOURS} \end{array}$$

$$\text{TIME LEFT} = 120 - 18 = 102 \text{ HOURS}$$

$$102 \text{ HOURS LEFT BETWEEN 12 MACHINES}$$

$$102 \div 12 = 8.5$$

Answer 8.5 hours

$$\begin{array}{r} 8.5 \\ 12 \overline{)102.00} \\ \underline{-96} \\ 60 \\ \underline{-60} \\ 0 \end{array}$$

26 (a) $0.\dot{7} = \frac{7}{9}$

Use this fact to show that $0.0\dot{7} = \frac{7}{90}$

$$0.\dot{7} \div 10 = 0.0\dot{7}$$

[1 mark]

$$\text{SO } \frac{7}{9} \div 10 = \frac{7}{9} \times \frac{1}{10} = \frac{7}{90}$$

26 (b) Using part (a) or otherwise, convert $0.2\dot{7}$ to a fraction.

Give your answer in its simplest form.

[3 marks]

$$\text{let } x = 0.2\dot{7}777\dots$$

$$10x = 2.7777\dots$$

$$\left[\begin{array}{r} 100x = 27.7777\dots \\ -10x = -2.7777\dots \end{array} \right] \text{SUBTRACT } 10x \text{ FROM } 100x$$

$$90x = 25$$

$$x = \frac{25}{90} = \frac{5}{18}$$

Answer $\frac{5}{18}$

27 (a)

Work out the value of $81^{-\frac{1}{4}}$

[2 marks]

$$= \frac{1}{81^{\frac{1}{4}}} = \frac{1}{3}$$

Answer $\frac{1}{3}$

27 (b)

Write 16×8^{2x} as a power of 2 in terms of x .

[3 marks]

$$16 = 2^4$$

$$8 = 2^3$$

$$8^{2x} = (2^3)^{2x} = 2^{3 \times 2x} = 2^{6x}$$

$$16 \times 8^{2x} = 2^4 \times 2^{6x} = 2^{4+6x}$$

Answer 2^{4+6x} or $2^{2(2+3x)}$

END OF QUESTIONS