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MATHEMATICS

0580/23

Paper 2 (Extended)

October/November 2022

1 hour 30 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π , use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 70.
- The number of marks for each question or part question is shown in brackets [].

This document has **12** pages.

2

- 1 Marco starts work at 2045 and finishes at 0208 the next day.

Find the length of time, in hours and minutes, he works.

..... h min [1]

2

120

121

149

164

216

From this list, write down

- (a) a square number

..... [1]

- (b) a cube number.

..... [1]

- 3 Calculate.

$$\sqrt{15} + \frac{4.8}{2.2}$$

..... [1]

3

- 4 The mean mass of four men in a rowing team is 97.5 kg.
The modal mass is 101 kg.
The range of the masses is 8 kg.

Find the mass of each of the four men.

..... kg , kg , kg, kg [3]

- 5 **Without using a calculator**, work out $\frac{5}{7} - \frac{2}{3}$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [2]

- 6 A spinner can land on the colours green, black or red.
The table shows the probabilities of the spinner landing on green or black.

Colour	Green	Black	Red
Probability	$\frac{2}{5}$	$\frac{1}{4}$	

(a) Complete the table. [2]

(b) Chang spins the spinner 120 times.

Find the expected number of times it lands on green.

..... [1]

- 7 Find the lowest common multiple (LCM) of 36 and 60.

..... [2]

- 8 A is the point $(-3, 5)$ and B is the point $(5, 2)$.

Find the coordinates of the midpoint of the line AB .

(..... ,) [2]

9 Solve the simultaneous equations.

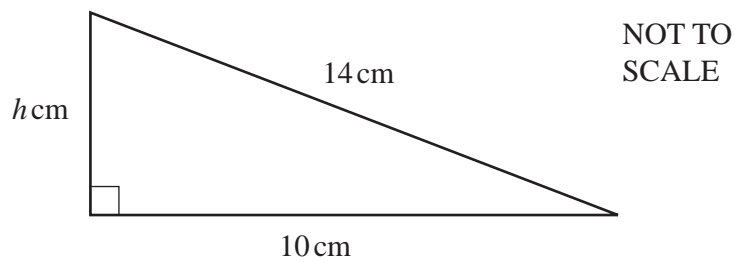
$$3x - 2y = 21$$

$$5x + 2y = 51$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots [2]$$

10



The diagram shows a right-angled triangle.

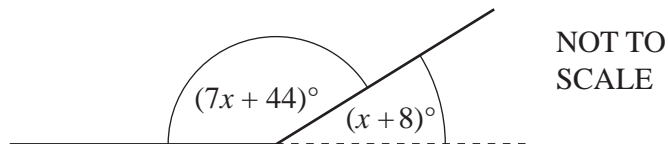
(a) Calculate the value of h .

$$h = \dots\dots\dots [3]$$

(b) Find the perimeter of this triangle.

$$\dots\dots\dots \text{ cm } [1]$$

11



The diagram shows two sides of a regular polygon.

The interior angle of the polygon is $(7x + 44)^\circ$ and the exterior angle is $(x + 8)^\circ$.

Find the number of sides of this polygon.

..... [4]

12 Keita invests \$4000 at a rate of 2.6% per year compound interest.

Work out the interest earned on the investment at the end of 3 years.

\$ [3]

13 Convert $0.2\dot{4}$ to a fraction.

You must show all your working and give your answer in its simplest form.

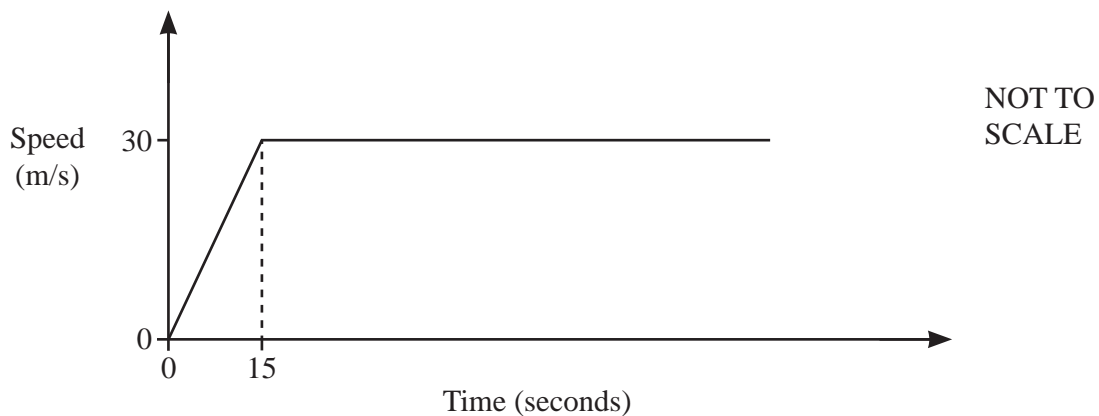
..... [2]

14 A map has a scale of 1 : 200 000.

Find the area, in square kilometres, of a lake that has an area of 12.4 cm^2 on the map.

..... km^2 [2]

15 The diagram shows the speed–time graph for part of the journey of a car.



The car starts from rest and accelerates at a uniform rate for 15 seconds before reaching a constant speed of 30 m/s.

(a) Calculate the acceleration for the first 15 seconds.

..... m/s^2 [1]

(b) After T minutes, the total distance travelled is 45 kilometres.

Find the value of T .

$T =$ min [4]

- 16** A kite is drawn on a coordinate grid.
The diagonals of the kite intersect at the point $(-2, -5)$.

One diagonal has equation $y = 4x + 3$.

Find the equation of the other diagonal of the kite.
Give your answer in the form $y = mx + c$.

$$y = \dots\dots\dots [3]$$

- 17** y is proportional to the square of $(x - 7)$.
When $x = 12$, $y = 2$.

Find y when $x = 17$.

$$y = \dots\dots\dots [3]$$

- 18** Two bottles are mathematically similar.
The small bottle has a capacity of 324 ml and a height of 12 cm.
The large bottle has a capacity of 768 ml.

Calculate the height of the large bottle.

$$\dots\dots\dots \text{ cm } [3]$$

19 $f(x) = 5x - 3, x > 1$

$$g(x) = \frac{10}{x-2}, x \neq 2$$

- (a) Find $gf(x)$.
Give your answer in its simplest form.

..... [2]

- (b) Find $g^{-1}(x)$.

$g^{-1}(x) =$ [3]

- (c) Find $ff^{-1}(x-1)$.

..... [1]

20 (a)

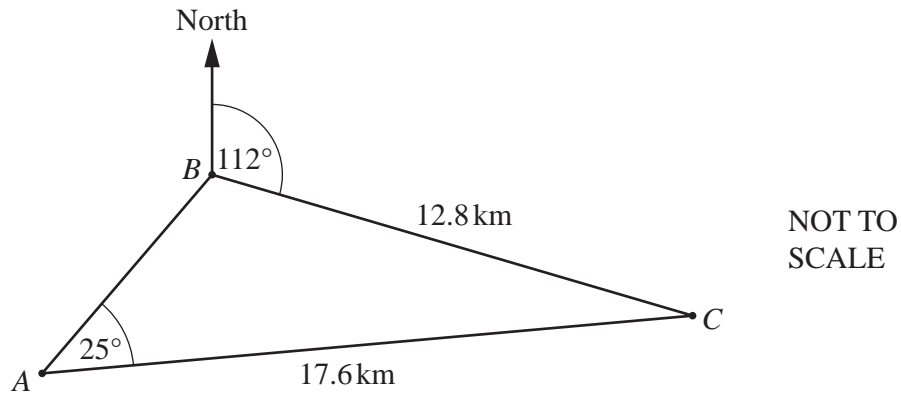


Sketch the graph of $y = \sin x$ for $0^\circ \leq x \leq 360^\circ$.

[2]

(b) Solve $3 - 2 \sin x = \frac{13}{4}$ for $0^\circ \leq x \leq 360^\circ$.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [3]



The diagram shows the positions of three ships A , B and C .
 $AC = 17.6$ km, $BC = 12.8$ km and angle $BAC = 25^\circ$.
 The bearing of C from B is 112° and angle ABC is obtuse.

Calculate the bearing of B from A .

..... [5]

Question 22 is printed on the next page.

22 (a) Expand and simplify.

$$(2x - 1)(x + 4)(x - 3)$$

..... [3]

(b) Write as a single fraction in its simplest form.

$$\frac{4}{2x - 3} \div \frac{2x^2 + 14x}{2x^2 + 11x - 21}$$

..... [4]

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