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0580/23

May/June 2017

1 hour 30 minutes

Additional Materials: Electronic calculator Geometrical instruments
Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

DO NOT WRITE IN ANY BARCODES.

For π , use either your calculator value or 3.142.

The total of the marks for this paper is 70.

This document consists of **11** printed pages and **1** blank page.

- 1 Calculate $\sqrt{\frac{1}{2}(1 - \cos 48^\circ)}$.

..... [1]

- 2 Factorise completely.

$$4x^2 - 8xy$$

..... [2]

- 3 Find the lowest common multiple (LCM) of 20 and 24.

..... [2]

- 4 Make a the subject of the formula.

$$x = y + \sqrt{a}$$

$a =$ [2]

- 5 Calculate the volume of a **hemisphere** with radius 3.2 cm.

[The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

.....cm³ [2]

- 6 The probability that Pedro scores a goal in any match is $\frac{2}{5}$.

Calculate the probability that Pedro scores a goal in each of the next two matches.

..... [2]

- 7 y is inversely proportional to x^2 .
When $x = 2$, $y = 8$.

Find y in terms of x .

$y =$ [2]

- 8 Simplify.

$$\left(\frac{8}{a^{12}}\right)^{\frac{1}{3}}$$

..... [2]

9 (a) $\overrightarrow{GH} = \begin{pmatrix} 6 \\ -4 \end{pmatrix}$

Find

(i) $5\overrightarrow{GH}$,

$$\begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

(ii) $\overrightarrow{HG}$.

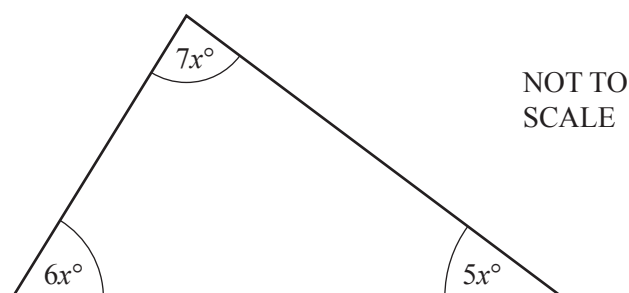
$$\begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

(b) $\begin{pmatrix} 6 \\ 7 \end{pmatrix} + \begin{pmatrix} 2 \\ y \end{pmatrix} = \begin{pmatrix} 8 \\ 3 \end{pmatrix}$

Find the value of y .

$$y = \dots\dots\dots [1]$$

10 The three angles in a triangle are $5x^\circ$, $6x^\circ$ and $7x^\circ$.



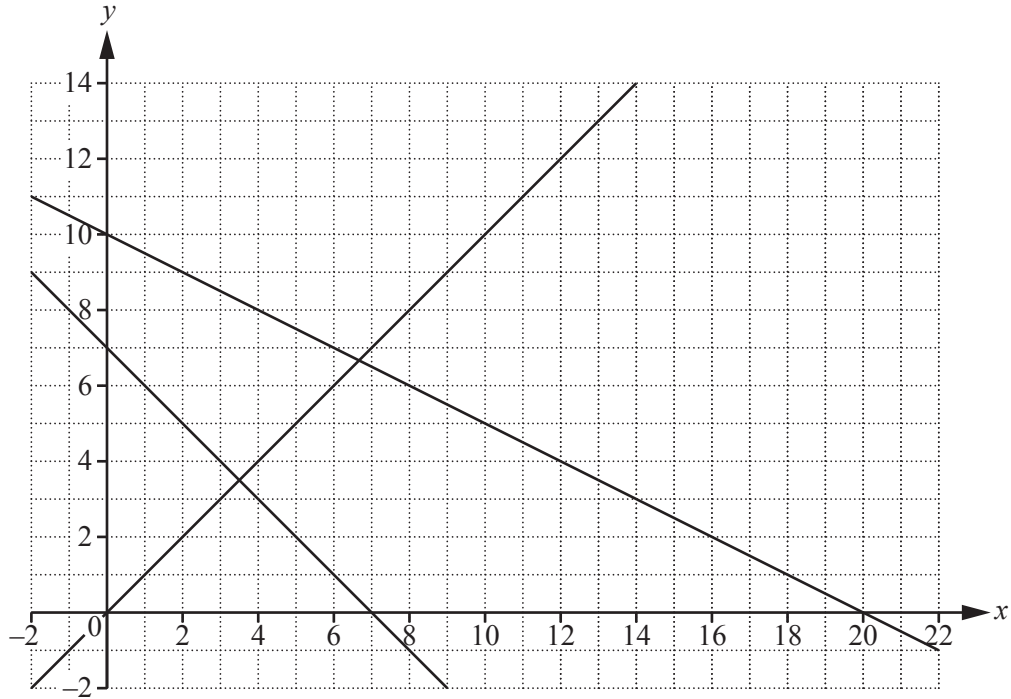
(a) Find the value of x .

$$x = \dots\dots\dots [2]$$

(b) Work out the size of the largest angle in the triangle.

$$\dots\dots\dots [1]$$

11



By shading the unwanted regions of the grid above, find and label the region R that satisfies the following four inequalities.

$$x \geq 0$$

$$x + y \geq 7$$

$$y \geq x$$

$$x + 2y \leq 20$$

[3]

12

$$f(x) = 3 + 4x$$

$$g(x) = 6x + 7$$

Find, in its simplest form,

(a) $f(3x)$,

..... [1]

(b) $fg(x)$.

..... [2]

- 13** Two bottles and their labels are mathematically similar.
 The smaller bottle contains 0.512 litres of water and has a label with area 96 cm^2 .
 The larger bottle contains 1 litre of water.

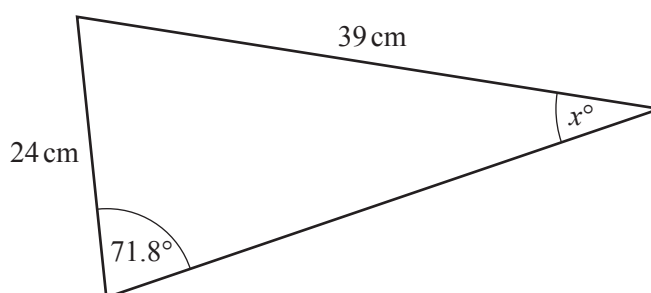
Calculate the area of the larger label.

..... cm^2 [3]

- 14** Write the recurring decimal $0.\dot{6}\dot{3}$ as a fraction in its lowest terms.
 You must show all your working.

..... [3]

15



NOT TO
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Find the value of x .

$x =$ [3]

- 16 (a) Solve the inequality.

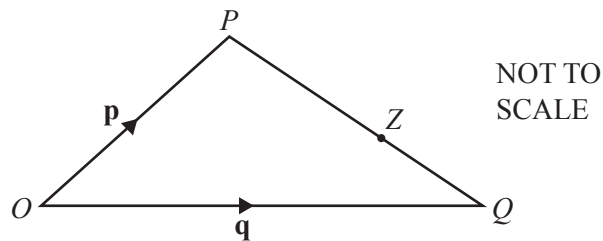
$$x + 13 \geq 3x + 7$$

..... [2]

- (b) List the positive integers that satisfy the inequality in **part (a)**.

..... [1]

17



O is the origin, $\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OQ} = \mathbf{q}$.
 Z is a point on PQ such that $PZ : ZQ = 5 : 2$.

Work out, in terms of $\mathbf{p}$ and $\mathbf{q}$, the position vector of Z .
 Give your answer in its simplest form.

..... [3]

- 18 The diagram shows a speed-time graph for the journey of a car.



Calculate the total distance travelled.

.....m [3]

- 19 **Without using your calculator**, work out $\frac{11}{12} - \left(\frac{3}{4} - \frac{2}{3}\right)$.

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

..... [4]

20 Simplify.

(a) $6w^0$

..... [1]

(b) $5x^3 - 3x^3$

..... [1]

(c) $3y^6 \times 5y^{-2}$

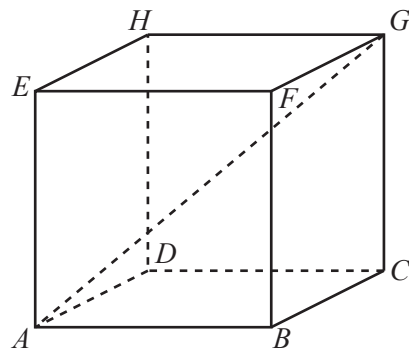
..... [2]

21 Solve the equation $5x^2 + 10x + 2 = 0$.

You must show all your working and give your answers correct to 2 decimal places.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [4]

- 22 The diagram shows a cube $ABCDEFGH$ of side length 26 cm.



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Calculate the angle between AG and the base of the cube.

..... [4]

- 23 (a) Simplify.

$$\frac{4(x-6)^2}{(x-6)}$$

..... [1]

- (b) Expand the brackets and simplify.

$$(x+4)^2 + 5(3x+2)$$

..... [3]

- 24** Marcel invests \$2500 for 3 years at a rate of 1.6% per year simple interest.
Jacques invests \$2000 for 3 years at a rate of $x\%$ per year compound interest.
At the end of the 3 years Marcel and Jacques receive the same amount of interest.

Calculate the value of x correct to 3 significant figures.

$x = \dots\dots\dots [5]$

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