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[illegible]

0178/02

October/November 2019

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical Instruments
Tracing Paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer all questions.

If working is needed for any question it must be shown below that question.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

The number of marks is given in brackets [] at the end of each question or part question.

The total of the marks for this paper is 70.

1 Work out.

(a) $11 - 3 \times 2 + \frac{3}{4}$ of 24

Answer (a) [2]

(b) $\frac{1}{1 - 3(0.5)^2}$

Answer (b) [2]

2 $M = \begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix}$ $M^2 = \begin{pmatrix} 2 & 3 \\ 3 & 5 \end{pmatrix}$

(a) Find M^3 .

Answer (a) $M^3 = \begin{pmatrix} & \\ & \end{pmatrix}$ [2]

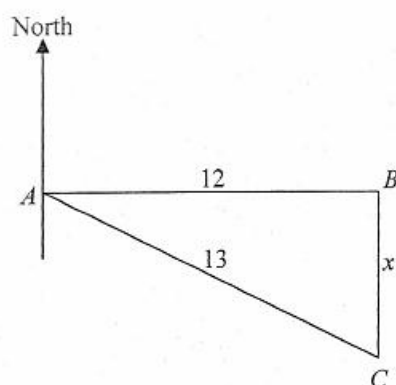
(b) $M^5 = \begin{pmatrix} x & 55 \\ y & 89 \end{pmatrix}$

Find the value of x and the value of y .

Answer (b) $x = \dots\dots\dots y = \dots\dots\dots$ [2]

- 3 In the diagram, B is 12 m due east of A .

C is 13 m from A and due south of B .



NOT TO
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Use the following information to answer the questions.

$$\sin^{-1}\left(\frac{12}{13}\right) = 67.4^\circ, \quad \cos^{-1}\left(\frac{12}{13}\right) = 22.6^\circ, \quad \tan^{-1}\left(\frac{12}{13}\right) = 42.7^\circ$$

- (a) Find the length, x .

Answer (a) m [2]

- (b) Calculate angle ACB .

Answer (b) [1]

- (c) Find the bearing of C from A .

Answer (c) [2]

4 Simplify.

(a) $(m - 2)^2 + (m^2 - 3)$

Answer (a) [2]

(b) $\frac{2^{x+1} - 2^{x-1}}{2^x}$

Answer (b) [3]

5 Triangle ABC has vertices $A(1, 1)$, $B(3, 1)$ and $C(3, 4)$

Triangle ABC is transformed by the matrix $P = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$.

(a) Find the coordinates of B and C after transformation P .

Answer (a) B (.....,)

C (.....,) [2]

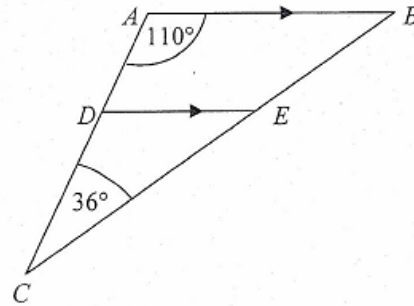
(b) Describe fully the transformation P .

Answer (b)

..... [2]

- 6 In the triangle ABC , AB is parallel to DE .

Angle $BAD = 110^\circ$ and angle $ACB = 36^\circ$.



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- (a) Find the size of the angle

(i) ABC ,

Answer (a)(i) [1]

(ii) CDE ,

Answer (a)(ii) [1]

(iii) DEB .

Answer (a)(iii) [2]

- (b) Explain why triangles ABC and DEC are similar.

Answer (b) [1]

- (c) Given that $CE = 3$ units and $EB = 2$ units.

Calculate the ratio $\frac{\text{area of } ABC}{\text{area of } DEC}$.

Answer (c) [2]

- 7 (a) Make t the subject of the formula.

$$P = \frac{\sqrt{t}}{3R}$$

Answer (a) [2]

- (b) Solve

$$96 = 3y^{\frac{5}{4}}.$$

Answer (b) $y =$ [3]

- (c) (i) Solve $-4 < -\frac{1}{2}x$.

Answer (c)(i) [2]

- (ii) Show the solution on the number line.

Answer (c)(ii)  [2]

- 8 A box of fruit juice contains a mixture of apple, orange, pineapple and tropical juices.
The mixture is in the ratio **apple: orange: pineapple: tropical** = 9 : 7 : 4 : 5.
The box contains 540 millilitres of apple juice.

(a) Find the total amount of fruit juice in the box in **litres**.

Answer (a) l [2]

(b) Calculate the amount of tropical juice in the box.

Give your answer in millilitres.

Answer (b) ml [2]

(c) 70% of the tropical juice is mango.

Calculate the amount of mango juice in the box.

Answer (c) ml [2]

9 Given $4n^2 - m^2 = 171$ and $2n - m = 9$.

(a) Calculate the value of $2n + m$.

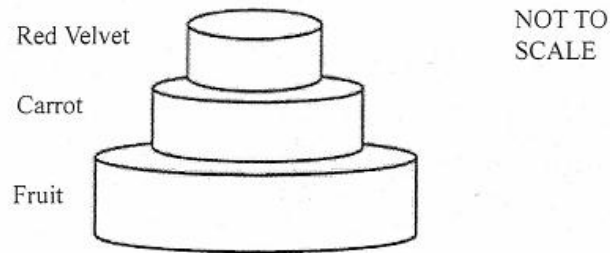
Answer (a) [3]

(b) Find the values of n and m .

Answer (b) $n =$

$m =$ [3]

- 10 The diagram shows a three-tiered-cake made up of three different flavours. The tiers have different diameters and heights.



- (a) The fruit cake has a **diameter of 30 cm** and a height of 10 cm.

Find the volume of fruit cake, **in terms of π** .

Answer (a) cm^3 [2]

- (b) The carrot cake has 30% less volume than the fruit cake.

Calculate the volume of the carrot cake, **in terms of π** .

Answer (b) cm^3 [2]

- (c) The diameter of the carrot cake is **2 cm less** than the fruit cake.

Find the height of the carrot cake.

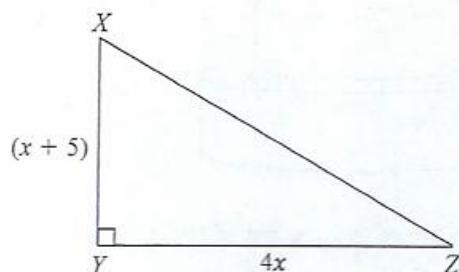
Leave your answer as a fraction.

Answer (c) cm [2]

- 11 The diagram shows triangle XYZ .

$XY = (x + 5)$ cm and $YZ = 4x$ cm.

The area of the triangle is 100 cm^2 .



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- (a) Use the information on the diagram to form an equation in x and show that it simplifies to

$$x^2 + 5x - 50 = 0.$$

Answer (a) [2]

- (b) Solve

$$x^2 + 5x - 50 = 0.$$

Answer (b) $x =$ or $x =$ [3]

- (c) Write down the length of the base and height of the triangle.

Answer (c) base = cm

height = cm [2]

12 Here is the list of numbers.

7, 5, 13, 5, 13, 4, 11, x , y

The mean of the numbers is 8 and the mode is 5.

Find

(a) the value of x and the value of y , where $x < y$,

Answer (a) $x = \dots\dots\dots$

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

(b) the median,

Answer (b) $\dots\dots\dots$ [2]

(c) the probability that two numbers selected at random without replacement are **both five**.

Answer (c) $\dots\dots\dots$ [2]