Candidate Name	Centre Number	Candidate Number

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

MATHEMATICS 4030/1

PAPER 1

JUNE 2018 SESSION 2 hours 30 minutes

Candidates answer on the question paper.
Additional materials:
Geometrical instruments

Allow candidates 5 minutes to count pages before the examination.

This booklet should not be punched or stapled and pages should not be removed.

TIME 2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your Name, Centre number and Candidate number in the spaces at the top of this page and your Centre number and Candidate number on the top right corner of every page of this paper.

Answer *all* questions.

Check that all the pages are in the booklet and ask the invigilator for a replacement if there are duplicate or missing pages.

Write your answers in the spaces provided on the question paper using **black** or **blue** pens.

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

Omission of essential working will result in loss of marks.

Decimal answers which are not exact should be given correct to three significant figures unless stated otherwise. Answers in degrees should be given correct to one decimal place unless stated otherwise.

Mathematical tables, slide rules and calculators should not be brought into the examination room.

INFORMATION FOR CANDIDATES

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

This question paper consists of 28 printed pages.

Centre Number	Candidate Number

NEITHER MATHEMATICAL TABLES NOR SLIDE RULES NOR CALCULATORS MAY BE USED IN THIS PAPER

1 **(a)** Express 3598

(i) as a number in standard form,

(ii) correct to 2 significant figures.

(b) Find the approximate value of $\sqrt{3598}$.

Answer: *(a)* *(i)* _____ [1]

(ii) _____ [1]

(b) _____ [1]

2 **(a)** Find the exact value of

(i) $7{,}03 - 2{,}145$,

(ii) $4{,}32 \times 0{,}11$.

(b) Simplify $1\frac{7}{8} + 2\frac{1}{3}$, giving the answer as a mixed number.

Answer *(a)* *(i)* _____ [1]

(ii) _____ [1]

(b) _____ [1]

Centre Number	Candidate Number

3 **(a)** Express the time 00 25 in 12 hour notation.

(b) A goods train left Johannesburg at 20 30 on a Wednesday and arrived in Beitbridge after travelling for 27 hours 45 minutes.

(i) State the day on which the train arrived at Beitbridge.

(ii) Find the time at which the train arrived at Beitbridge.

Answer *(a)* _____ [1]

(b) *(i)* _____ [1]

(ii) _____ [1]

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4 Evaluate

(a) $\sqrt[3]{0{,}027}$,

(b) $\left(1\frac{7}{9}\right)^{\frac{1}{2}}$,

(c) $3^0 \times 3^{-2}$.

Answer *(a)* _____ [1]

(b) _____ [1]

(c) _____ [1]

Centre Number	Candidate Number

5 (a) State the number of lines of symmetry of a regular nonagon.

(b) The sum of interior angles of a regular polygon is $3\,960^0$.

Find the number of sides of the regular polygon.

Answer *(a)* _____ [1]

(b) _____ [2]

Centre Number	Candidate Number

6 **(a)** Simplify $1044_8 - 175_8$, giving the answer in base 8.

(b) Convert 10111_2 to a number in base 6.

Answer *(a)* _____ [1]

(b) _____ [2]

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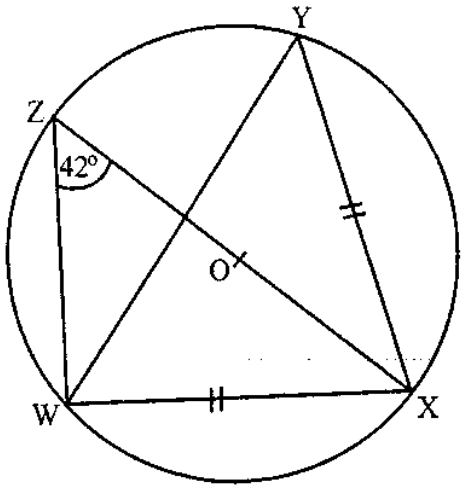
7



In the diagram W, X, Y and Z are points on the circumference of a circle centre O, WX = XY and $X\hat{Z}W = 42°$.

Calculate

(a) $W\hat{Y}X$,

(b) $Y\hat{W}Z$,

(c) $W\hat{X}Y$.

Answer *(a)* _____ [1]

(b) _____ [1]

(c) _____ [1]

Centre Number	Candidate Number

8 Solve the equations:

(a) $\frac{1}{3}x - 1 = 7$

(b) $4^{2n-3} = 8$

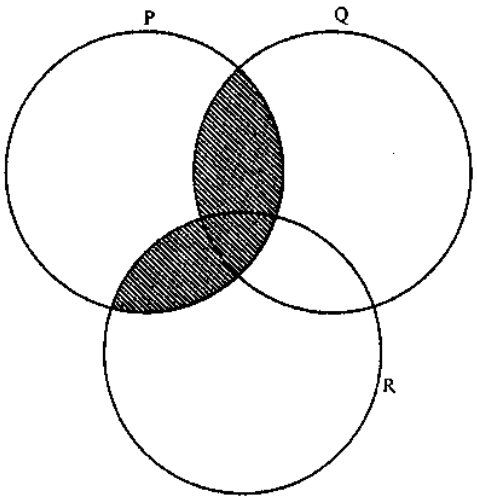
Answer *(a)* $x =$ _____ [1]

(b) $n =$ _____ [2]

Centre Number	Candidate Number

9 **(a)** Three sets A, B and C are such that $A \sqsubset B$ and $C \sqsubset A$. In the answer space, draw the Venn diagram to show the relationship between sets A, B and C.

(b)



In the diagram, three sets P, Q and R are intersecting. Use set notation to describe the shaded region.

Answer *(a)* [2]

(b) _____ [1]

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10 It is given that y varies directly as the square of $(x - 3)$.

(a) Express y in terms of x and a constant k.

(b) Given that $y = 16$ when $x = 1$, find y when $x = 10$.

Answer *(a)* _____ [1]

(b) _____ [2]

Centre Number	Candidate Number

11 Solve the simultaneous equations:

$$x + y = 5\frac{1}{2}$$

$$x - 2y = 2\frac{1}{2}$$

Answer x = _____

y = _____ [3]

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12 It is given that $3x + 2y = 12$ is an equation of a straight line.

(a) Find the gradient of the straight line.

(b) Find the coordinates of the point where the straight line crosses the y-axis.

Answer *(a)* _____ [1]

(b) _____(_____;_____)_____[2]

13 Simplify

$$\frac{3x^2}{x^2 - 5x} \div \frac{x}{x^2 - 25}.$$

Answer _____ [3]

14 The formula for converting a temperature in degrees centigrade (°C) to a temperature in degrees Fahrenheit (°F) is $F = 32 + \frac{9C}{5}$.

(a) Find F when $C = 30°$.

(b) Make C the subject of the formula.

Answer *(a)* F = _____ [1]

(b) C = _____ [2]

Centre Number	Candidate Number

15 **(a)** Expand and simplify,

$$-3(x-7)+5(2-4x).$$

(b) The length of a side of a regular hexagon is 3,4 cm correct to one decimal place.

Find the least possible perimeter of the regular hexagon.

Answer *(a)* _____ [2]

(b) _____ [2]

Centre Number	Candidate Number

16 **(a)** Factorise completely

(i) $x^3 - x$,

(ii) $x^2 + 2x + 1$.

(b) Hence or otherwise find the Highest Common Factor (HCF) of $x^3 - x$ and $x^2 + 2x + 1$.

Answer *(a)* *(i)* _____ [2]

(ii) _____ [1]

(b) _____ [1]

Centre Number	Candidate Number

17 It is given that vector $\mathbf{p} = \begin{pmatrix} 3 \\ -4 \end{pmatrix}$ and vector $\mathbf{q} = \begin{pmatrix} -2 \\ x \end{pmatrix}$.

(a) Calculate $\mathbf{p} - \mathbf{q}$ in terms of x.

(b) Find the value of

(i) $|\mathbf{p}|$, the magnitude of vector $\mathbf{p}$.

(ii) x such that $2\mathbf{p} = -3\mathbf{q}$.

Answer *(a)* $\mathbf{p} - \mathbf{q} =$ _____ [1]

(b) *(i)* $|\mathbf{p}|$ _____ [1]

(ii) $x =$ _____ [2]

18 The marks of 6 of the students who wrote a mathematics test are as follows:

15; 14; 9; 12; 11; 15.

(a) Find the median mark for the 6 students.

(b) A seventh student got x marks from the same test and the mean mark for the seven students was 13.

Find x, the mark of the seventh student.

Answer *(a)* _____ [1]

(b) _____ [3]

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19 It is given that set

$$P = \{-11;\ -2;\ 0;\ 1;\ 2;\ 3;\ \sqrt{11};\ 9;\ 17;\ 21.\}$$

(a) A number is chosen at random from set P.

Find the probability that the number is either a negative number or a prime number.

(b) Two numbers are chosen at random from set P one after the other, without replacement.

Find the probability that one is a perfect square and the other is a factor of 21.

Answer *(a)* _____ [2]

(b) _____ [2]

Centre Number	Candidate Number

20 **(a)** **(i)** Solve the inequality

$2(x-3) < 7.$

(ii) Write down the largest perfect square that satisfies the inequality $2(x-3) < 7.$

(b) Two similar bottles have heights 8 cm and 12 cm. The mass of the bottle of height 8 cm is 40 g.

Find the mass of the similar bottle that has a height of 12 cm.

Answer *(a)* *(i)* _____ [2]

(ii) _____ [1]

(b) _____ [2]

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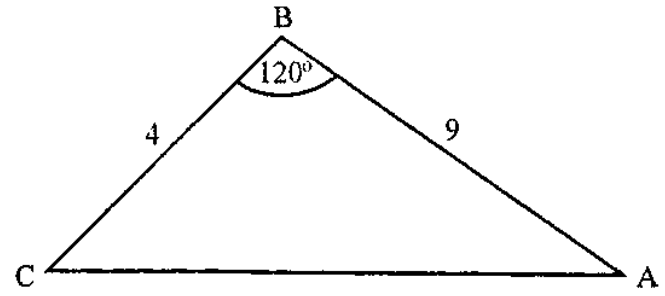
21



ABC is a triangle with AB = 9 cm, BC = 4 cm and $A\hat{B}C = 120°$.

Use as much of the information given below as is necessary.
[tan 60° = 1,73; Sin 60° = 0,87; Cos 60° = 0,5]

Find the

(a) area of triangle ABC,

(b) length of AC leaving the answer in surd form.

Answer *(a)* _____ cm^2 [2]

(b) _____ cm [3]

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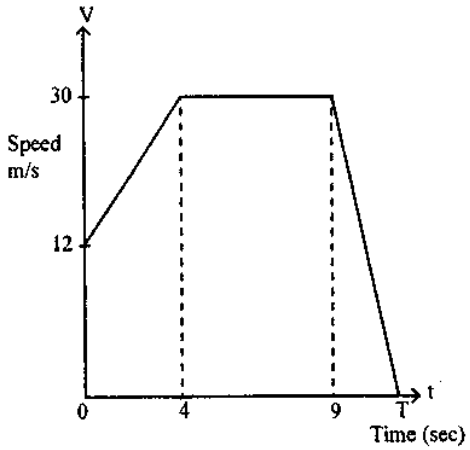
22



The diagram is the speed –time graph of an object whose initial speed is 12 m/s. The object accelerates uniformly for 4 seconds until it reaches a speed of 30 m/s. It then travels at this speed for 5 seconds and then decelerates at 6 m/s^2 until it comes to rest.

Calculate the

(a) acceleration from $t = 0$ to $t = 4$,

(b) distance travelled from $t = 0$ to $t = 9$,

(c) value of T, the total time taken for the whole journey.

Answer *(a)* _____ [1]

(b) _____ [2]

(c) _____ [2]

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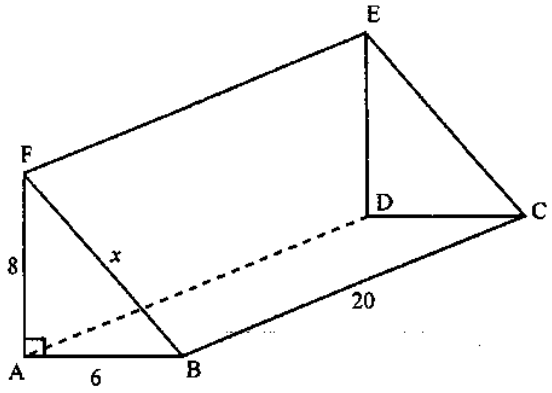
23



In the diagram, ABCDEF is a solid triangular prism. AB = 6 cm, BC = 20 cm, AF = 8 cm, FB = x cm and $\widehat{BAF} = 90°$.

(a) Find x.

(b) Calculate the total surface area of the prism.

Answer *(a)* _____ [2]

(b) _____ [3]

Centre Number	Candidate Number

24 **(a)** Evaluate

(i) $\log_3 45 - \log_3 5$,

(ii) $\frac{\log\ 0{,}2}{\log\ 5}$.

(b) Express as a logarithm of a single number,

$3\log 2 + \frac{1}{2}\log\ 81$.

Answer *(a)* *(i)* _____ [2]

(ii) _____ [2]

(b) _____ [2]

25 It is given that

$$3\begin{pmatrix} p & -1 \\ 0 & 4 \end{pmatrix} - \begin{pmatrix} 7 & q \\ -2 & 2r \end{pmatrix} = \frac{1}{2}\begin{pmatrix} 16 & 8 \\ 4 & -12 \end{pmatrix}$$

Find the value of

(i) p,

(ii) q,

(iii) r.

Answer *(i)* _____ [2]

(ii) _____ [2]

(iii) _____ [2]

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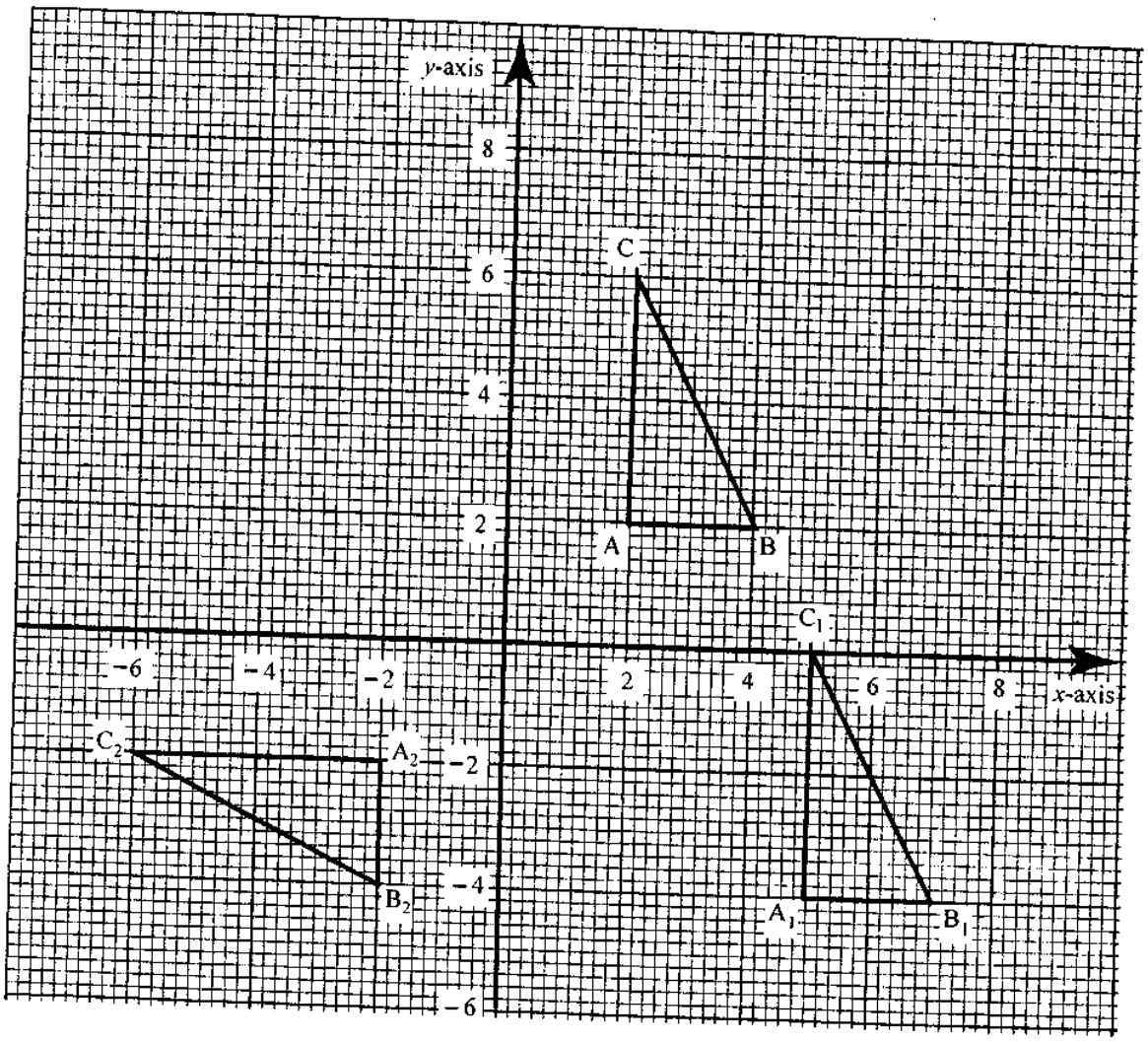
26



The diagram shows three triangles ABC, $A_1B_1C_1$ and $A_2B_2C_2$

(a) Triangle ABC is mapped onto triangle $A_1B_1C_1$ by a single transformation. Describe **fully** this transformation.

Answer (a) _____

_____

_____ [3]

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26 **(b)** Triangle ABC is mapped onto triangle $A_2B_2C_2$ by a reflection.

Find the

(i) equation of the axis of reflection,

(ii) matrix that represents this reflection.

(b) *(i)* _____ [1]

(ii) _____ [2]