BOTSWANA EXAMINATIONS COUNCIL
in collaboration with
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE
Botswana General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

MATHEMATICS

Paper 1

0563/01

October/November 2010

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces provided at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

If working is needed for any question, it must be shown below that question. Omission of essential working will result in loss of marks.

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

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 50.

If the degree of accuracy is not specified in the question and if the answer is not exact, the answer should be given to three significant figures.

THE USE OF ANY CALCULATING AID IS NOT ALLOWED IN THIS PAPER.

For Examiner's Use

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

[Turn over

Mathematical formulae for papers 1 and 2

Surface area and volume of solids

Name of solid	Total surface area	Volume
cone	$\pi r^2 + \pi rl$	$\frac{1}{3}\pi r^2 h$
pyramid		$\frac{1}{3}$ base area × height
sphere	$4\pi r^2$	$\frac{4}{3}\pi r^3$

Trigonometry

Sine Rule $$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Area of a triangle $$= \frac{1}{2}ab \sin C$$

1 **(a)** Evaluate $10^{-4} \times 10^{5}$

(b) Find the value of n for which $2^n = \frac{1}{64}$.

Answer (*a*) ..... [1]

(*b*) n = ... [2]

---

2 Given that $\mathbf{p} = \begin{pmatrix} -12 \\ 5 \end{pmatrix}$ and $\mathbf{q} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$,

(a) express $\mathbf{p} + 2\mathbf{q}$ as a column vector,

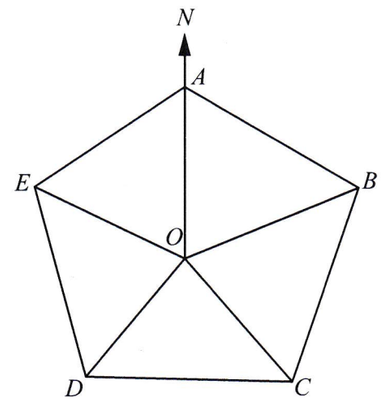
(b) calculate the magnitude of $\mathbf{p}$.

Answer (*a*) ( ) [2]

(*b*)..... [2]

---

3 The diagram below shows a regular pentagon $ABCDE$, centre O. The line OA lies on the north line, ON.



Calculate

(a) the size of $A\hat{O}B$,

(b) the bearing of E from O.

Answer (*a*) ..... [2]

(*b*) ..... [2]

---

4 **(a)** Given that $A = \sqrt{x^2 + 4y}$, find the value of A when $x = 4$ and $y = 5$.

(b) Make k the subject of the formula $3w - k = 5k + 7$.

Answer (*a*) ..... [2]

(*b*) ..... [2]

---

5 **(a)** Factorise completely $a^2 - b^2$.

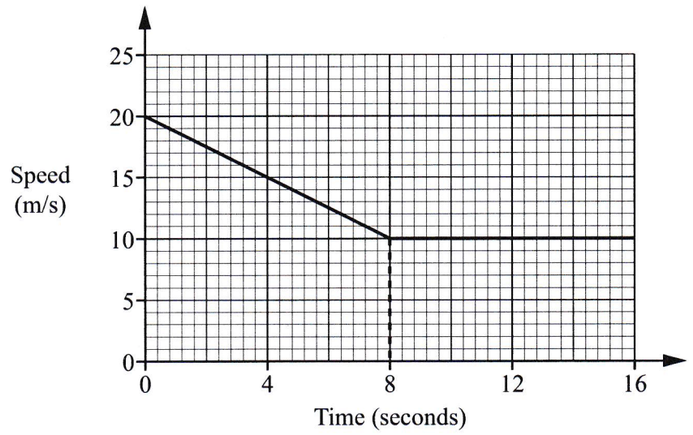
(b) Hence, or otherwise, find the value of $501^2 - 499^2$.

Answer (*a*) ..... [1]

(*b*) ..... [1]

---

6 The graph below illustrates the speed of a car in a period of 16 seconds as it drives along a gravelled road.



(a) Find

(i) the speed of the car when $t = 4$,

(ii) the acceleration when $t = 12$.

(b) Calculate the total distance travelled during the 16 seconds.

Answer (*a*) (i) .....m/s [1]

(ii) ..... m/s^2 [1]

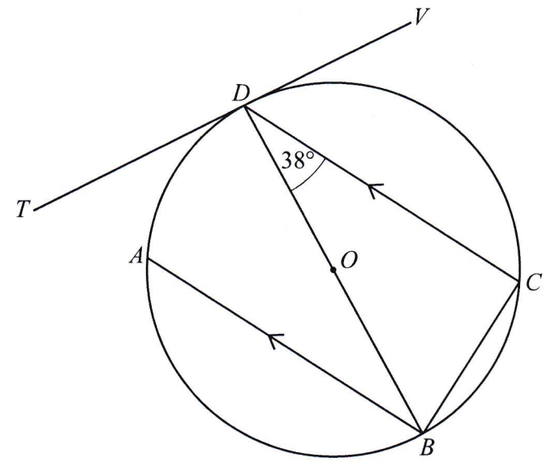
(*b*) ..... m [2]

---

7 The points A, B, C and D lie on the circumference of a circle centre O.

AB and DC are parallel. BD is a straight line passing through O and $B\hat{D}C = 38°$.

TV is a tangent of the circle at D.



Find the size of

(a) $T\hat{D}B$,

(b) $C\hat{B}D$,

(c) $A\hat{B}D$.

Answer (*a*) ..... [1]

(*b*) ..... [1]

(*c*) ..... [1]

---

8 The distribution below shows the heights, in cm, of five athletes in a training camp.

171 131 159 143 131

(a) Find the median of the heights of the athletes.

(b) When the sixth and the tallest athlete joins the camp the range becomes 42 cm.

Calculate the height of the sixth athlete.

Answer (*a*) .....cm [1]

(*b*) .....cm [2]

---

9 Thuto has some money in a coin box. He adds equal sums of money to the box every day. After the first day the box contains 35t, after the second day it contains 50t and after the third day it contains 65t.

He continues to save for several more days.

(a) How much money will be in the coin box after saving on the 4th day?

(b) **(i)** Find the expression, in terms of n, for the amount of money in the box after saving on the nth day.

(ii) How much money will be in the coin box after saving on the 20th day?

Answer (*a*) .....thebe [1]

(*b*)(i) ..... [2]

(ii) ..... [1]

---

10 A box contains 40 identical crayons in colours black, blue, red or white.

The table below shows the probability of picking a crayon in each of these colours.

Colour of crayon	Black	Blue	Red	White
Probability	$\frac{1}{10}$	$\frac{3}{10}$	$\frac{1}{5}$	w

(a) Find w, the probability of picking a white crayon.

(b) Calculate the number of blue crayons in the box.

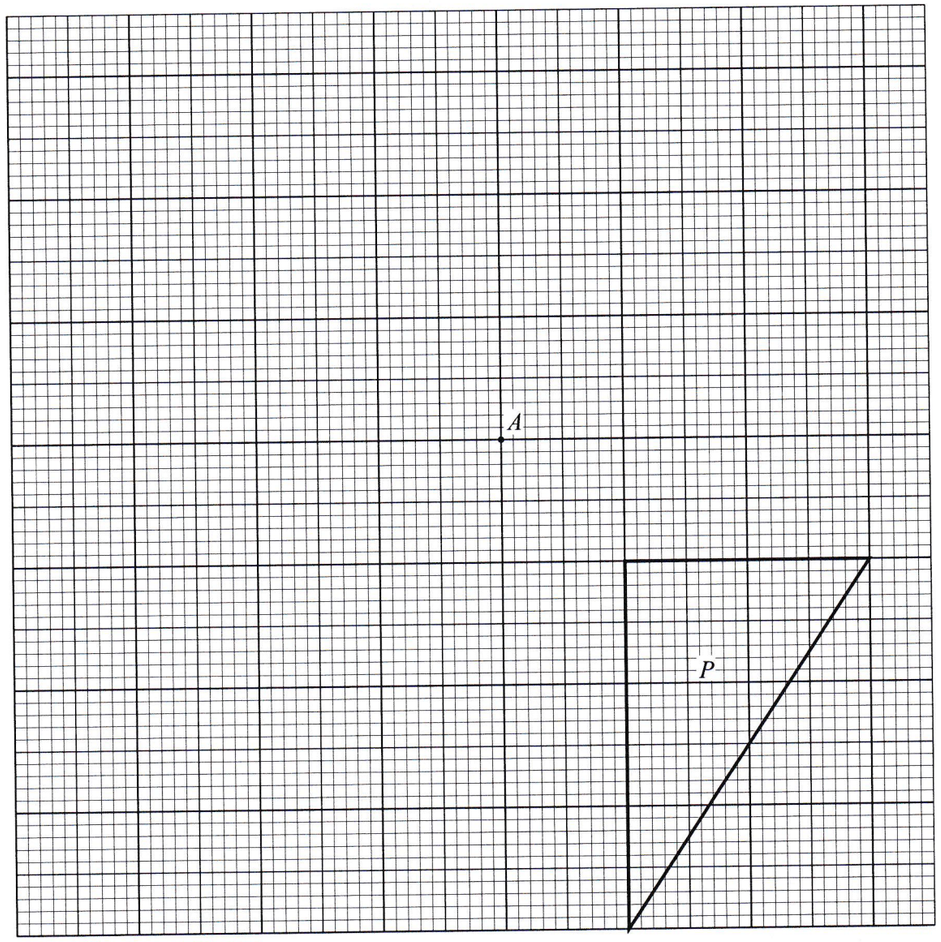
Answer (*a*) ..... [2]

(*b*) ..... [1]

---

11 The diagram below shows a triangle P and a point A.

Draw the image of P under an enlargement of scale factor $-\frac{1}{2}$, with centre A.



[2]

12 Thabo's salary is increased by 8% from P2500.

Calculate his new salary after the increase.

Answer P ..... [2]

13 Solve the simultaneous equations.

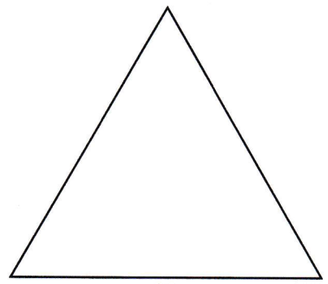
$$2w - v = 5$$
$$w - 3v = 10$$

Answer $w =$ .....

$v =$ ..... [3]

14 A sign board is a prism which is 3 mm thick.

The diagram shows the cross-section of the board, which is an equilateral triangle of side 80 cm.



sin 60° = 0.866
cos 60° = 0.500
tan 60° = 1.732

Using as much of the given information as necessary, calculate

(a) the area of the cross-section,

(b) the volume of the material used to make the sign board.

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

(*b*) ..... cm^3 [3]

15 A train left Palapye at 22 10 and arrived in Bulawayo after $7\frac{1}{2}$ hours.

(a) At what time did the train arrive in Bulawayo?

(b) The distance from Palapye to Bulawayo is 330 km.

Calculate the average speed of the train from Palapye to Bulawayo.

Answer (*a*) ..... [2]

(*b*) .....km/h [2]

BLANK PAGE