

Candidate Name

Centre Number

Candidate Number



**ZIMBABWE SCHOOL EXAMINATIONS COUNCIL**  
General Certificate of Education Ordinary Level

**MATHEMATICS**  
**PAPER 1**

**4008/1, 4028/1**

**JUNE 2010 SESSION**

**2 hours 30 minutes**

Candidates answer on the question paper.

Additional materials:

Geometrical instruments

**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.

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 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.

**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.

**FOR EXAMINER'S USE**

**This question paper consists of 30 printed pages and 2 blank pages.**

Copyright: Zimbabwe School Examinations Council, J2010.

©ZIMSEC J2010.

**[Turn over**

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

For  
Examiner's  
Use

- 1 (a) Express 0.096
- correct to two decimal places,
  - as a common fraction, giving your answer in its lowest terms.
- (b) Express 36 minutes as a percentage of two hours.

FOR EXAMINER'S USE

Answer

(a) (i) \_\_\_\_\_ [1]

(ii) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ % [1]

- 2 (a) Write down, in ordinary form, the value of  $4,32 \times 10^4$ .
- (b) Given that  $M = 3,6 \times 10^2$  and  $N = 8 \times 10^{-1}$ , find in standard form, the value of
- (i)  $MN$ ,
- (ii)  $M + N$ .

Answer (a) \_\_\_\_\_ [1]

(b) (i) \_\_\_\_\_ [1]

(ii) \_\_\_\_\_ [1]

- 3 (a) For the expressions  $12 m^3 n^2$  and  $18 m^2 n^3$ , find  
(i) the H.C.F,  
(ii) the L.C.M.  
(b) Simplify  $6x + 12x + 3$ .

*Answer* (a) (i) \_\_\_\_\_ [1]  
                 (ii) \_\_\_\_\_ [1]  
                 (b) \_\_\_\_\_ [1]

- 4 (a) Convert 408 to a number in base 6.
- (b) Write down  $2 \times 3^4 + 1 \times 3^2 + 2 \times 3^1$  as a number in base 3.
- (c) Given that  $42_x + 53_x = 125_x$ , find the value of  $x$ .

For  
Examiner's  
Use

- Answer (a) \_\_\_\_\_ [1]
- (b) \_\_\_\_\_ [1]
- (c)  $x =$  \_\_\_\_\_ [1]

6

For  
Examiner's  
Use

Given that  $m = \frac{1}{2}$ ,  $n = 0$  and  $r = 3$ , evaluate

(a)  $(mr)^n$ ,

(b)  $\left(2\frac{1}{4}\right)^m$ ,

(c)  $\sqrt[5]{-64}$ .

Answer

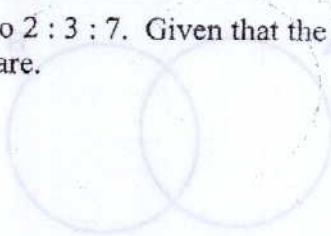
(a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [1]

(c) \_\_\_\_\_ [1]

For  
Examiner'  
Use

- 6 (a) Given that  $12 : d = 3 : 7$ , find the value of  $d$ .
- (b) A sum of money is divided in the ratio  $2 : 3 : 7$ . Given that the largest share is \$224 000, calculate the smallest share.



Answer

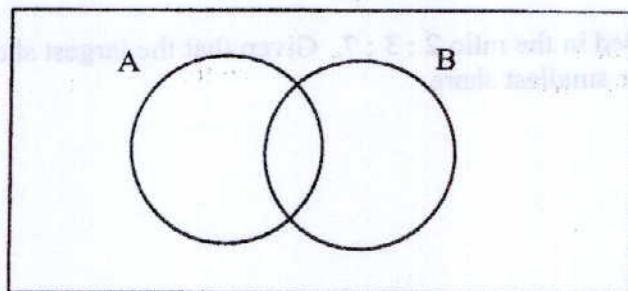
(a)  $d =$  \_\_\_\_\_

[1]

(b) \$ \_\_\_\_\_

[2]

- 7 Given that  $n(\xi) = 25$ ,  $n(A) = 12$ ,  $n(B') = 6$  and  $n(A \cup B)' = 2$ , complete the Venn diagram to show the number of elements in each subset.



Answer on diagram

[3]

- 8 (a) Simplify  $\sqrt{50}$ , leaving your answer in the form  $a\sqrt{b}$ .
- (b) Find, in km/h, the rate at which a car travels if it covers 24 metres in 1 second.

Answer (a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ km/h [2]

**10**

9 Solve the simultaneous equations

$$\frac{1}{2}x + 3y = 4,$$

$$3x + 2y = 8.$$

For  
Examiner's  
Use

(i)

(ii)

[8] *Answer*

$x =$

\_\_\_\_\_

$y =$

[3]

10 A company director went to Britain and America on business. Her company gave her an allowance of £2000.

- (a) While in Britain she spent  $\frac{1}{5}$  of her allowance. Calculate the amount she spent.
- (b) On arrival in America she converted all her remaining allowance into US\$ at the rate of £1 to US\$1.92. Calculate the amount she received in US\$.

Answer	(a) £ _____	[1]
	(b) US\$ _____	[2]

12

11 Solve the following equations:

(a)  $\frac{3}{y} = \frac{12}{11}$

(b)  $x^2 + 5x = 24$

(1)

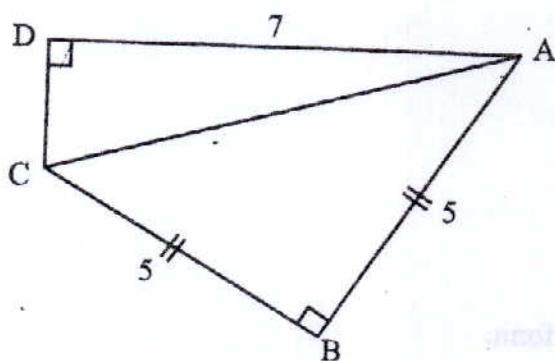
Answer (a)  $y =$  \_\_\_\_\_ [1]

(b)  $x =$  \_\_\_\_\_ or \_\_\_\_\_ [2]

12

13

For  
Examiner's  
Use



In the diagram,  $\hat{A}BC = \hat{ADC} = 90^\circ$ ,  $AB = BC = 5$  cm and  $AD = 7$  cm.

- Write down the value of  $\tan B\hat{A}C$ .
- Calculate the length of the line DC.

Answer

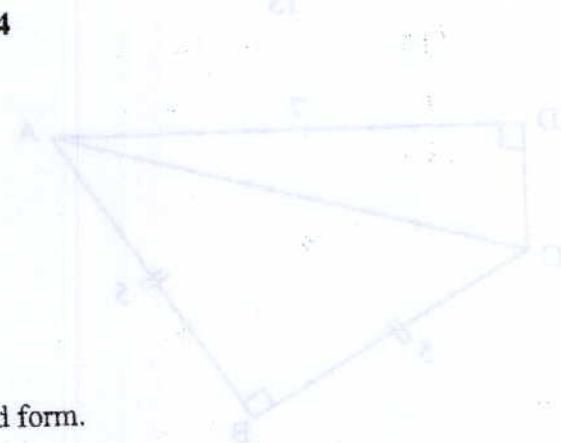
(a)  $\tan B\hat{A}C = \underline{\hspace{2cm}}$  [1]

(b)  $DC = \underline{\hspace{2cm}}$  cm [2]

- 13 It is given that  $\mathbf{p} = \begin{pmatrix} 4 \\ -6 \end{pmatrix}$  and  $\mathbf{q} = \begin{pmatrix} 6 \\ x \end{pmatrix}$ .

Find

- (a)  $x$ , if  $p$  is parallel to  $q$ ,
- (b)  $|\mathbf{p}|$ , leaving your answer in surd form.



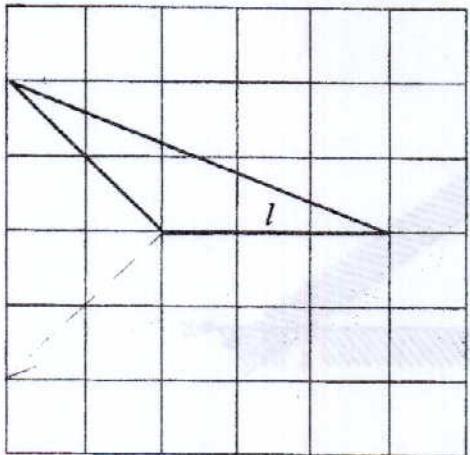
Answer

(a)  $x =$  \_\_\_\_\_ [1]

(b)  $|\mathbf{p}| =$  \_\_\_\_\_ [2]

14

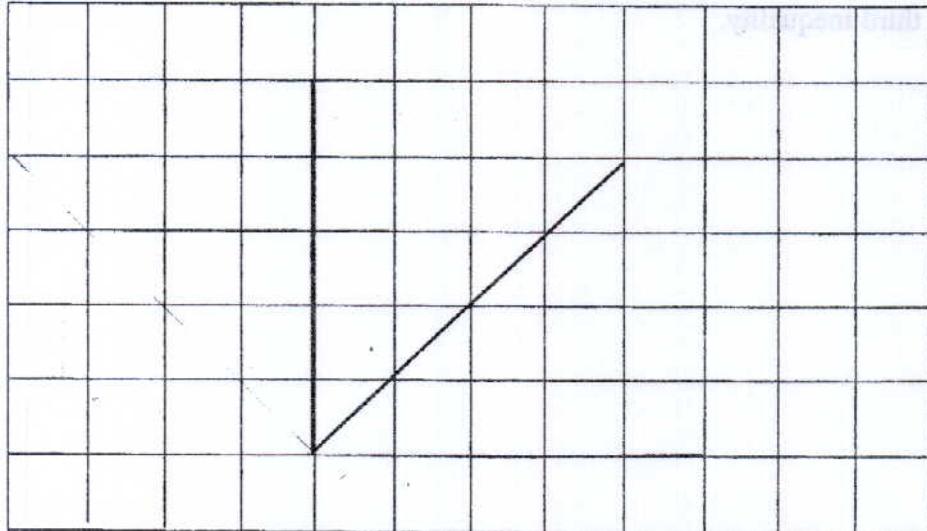
(a)



For  
Examiner's  
Use

In the diagram,  $l$  is a line of symmetry of a quadrilateral. On the diagram, complete the quadrilateral.

(b)



In the diagram, add **one** line so that the completed diagram has rotational symmetry of order 2.

*Answer*

(a) on diagram.

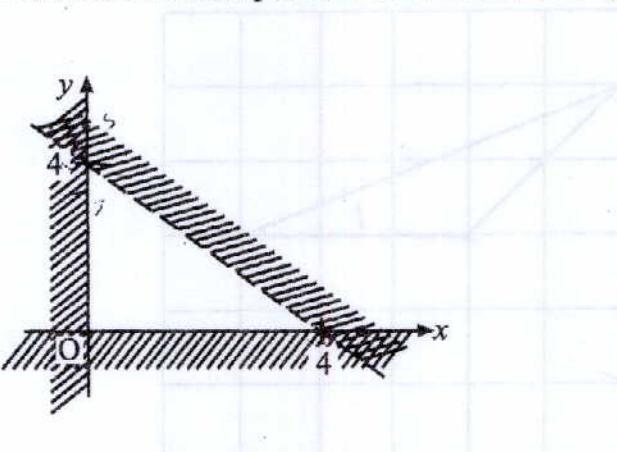
[1]

(b) on diagram.

[2]

- 15 (a) Given that  $x \geq 0.5$ ; state the least possible value of  $x$  if  $x$  is a prime number.

(b)



The diagram shows the region defined by three inequalities, two of which are  $x \geq 0$  and  $y \geq 0$ .

Find the third inequality.



Answer

(a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [2]

- 16 It is given that  $\mathbf{D}$  is a 2 by 2 matrix such that  $\mathbf{D} + \begin{pmatrix} -6 & -8 \\ 3 & 4 \end{pmatrix} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$ .

(a) Find  $\mathbf{D}$ .

(b) Write down the determinant of  $\begin{pmatrix} -6 & -8 \\ 3 & 4 \end{pmatrix}$ .

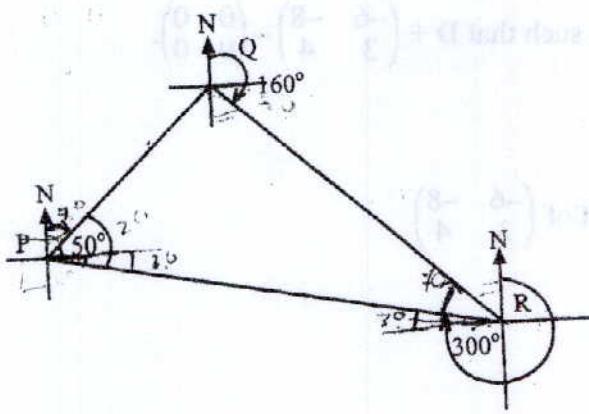
Answer (a)  $\mathbf{D} = \begin{pmatrix} & \\ & \end{pmatrix}$  [2]

(b) \_\_\_\_\_ [1]

18

For  
Examiner's  
Use

17



P, Q and R are three points on level ground. The bearing of R from Q is  $160^\circ$ , the bearing of P from R is  $300^\circ$  and  $\angle QPR = 50^\circ$ . Find the three figure bearing of

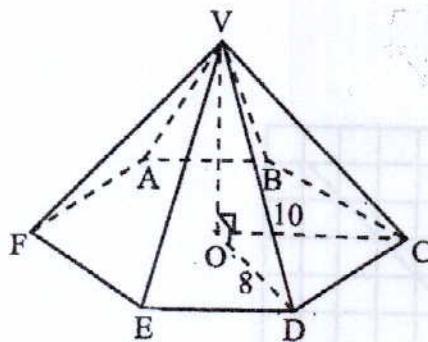
(a) Q from R,

(b) Q from P.

*Answer*

(a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [2]



The diagram shows a right pyramid whose base ABCDEF is a regular hexagon of centre O.  $OD = 8 \text{ m}$ ,  $VD = 10 \text{ m}$  and the area of triangle  $DOC = 15.6 \text{ m}^2$ .

- Show that the height (VO) of the pyramid is 6 m.
- Find the volume of the pyramid.

[Volume of pyramid =  $\frac{1}{3}$  base area x height]

*(a)  $V = 3 \text{ m}^2 \times 6$  (a)*

*$VO = 6 \text{ m}$  (a)*

*$VO = 6 \text{ m}$  (a)*

*$VO = 6 \text{ m}$  (a)*

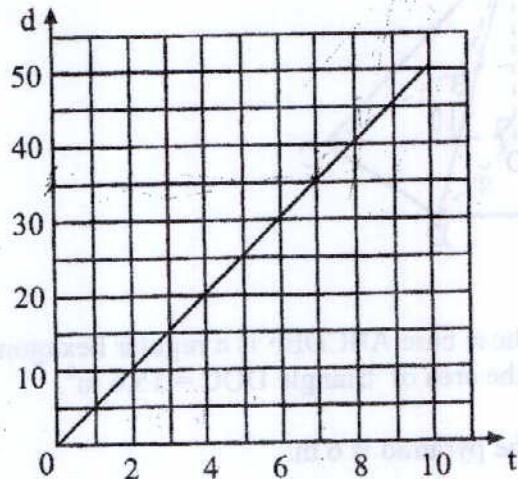
Answer (a) \_\_\_\_\_

[1]

(b) \_\_\_\_\_  $\text{m}^3$  [2]

19

20

For  
Examiner's  
Use

The graph shows the relationship between two variables  $t$  and  $d$ . Use the graph to find the value of

- (a)  $d$  when  $t = 7$ ,
- (b)  $t$  when  $d = 20$ ,
- (c)  $k$  when  $t = kd$ .

Answer

(a)  $d = \underline{\hspace{2cm}}$  [1]

(b)  $t = \underline{\hspace{2cm}}$  [1]

(c)  $k = \underline{\hspace{2cm}}$  [2]

20 A map is drawn to a scale of  $1 : 100\,000$ .

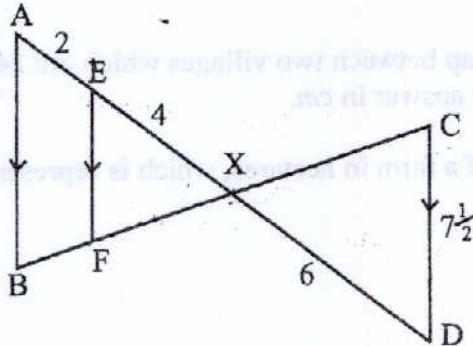
- (a) Find the distance on the map between two villages which are  $24\text{ km}$  apart on the ground, giving your answer in  $\text{cm}$ .
- (b) Calculate the actual area of a farm in hectares, which is represented by  $408\text{ cm}^2$  on the map.

*area of triangle ABC =  $\frac{1}{2} \times AB \times BC \times \sin C$ . area of triangle ABC =  $\frac{1}{2} \times 10 \times 12 \times \sin 60^\circ$ . area of triangle ABC =  $30\sqrt{3}$  cm<sup>2</sup>*

- area of triangle ABC =  $30\sqrt{3}$  cm<sup>2</sup> (a)*
- area of triangle ABC =  $30\sqrt{3}$  cm<sup>2</sup> (b)*
- area of triangle ABC =  $30\sqrt{3}$  cm<sup>2</sup> (c)*
- area of triangle ABC =  $30\sqrt{3}$  cm<sup>2</sup> (d)*

- Answer* (a) \_\_\_\_\_  $\text{cm}$  [1]
- (b) \_\_\_\_\_  $\text{ha}$  [3]

21



For  
Examiner's  
Use

In the diagram,  $AEXD$  and  $BFXC$  are straight lines.  $AE = 2 \text{ cm}$ ,  $EX = 4 \text{ cm}$ ,  $XD = 6 \text{ cm}$  and  $CD = 7\frac{1}{2} \text{ cm}$ .  $AB$ ,  $EF$  and  $CD$  are parallel.

- (a) Name, in correct order, the triangle which is
- congruent to  $\triangle XCD$ ,
  - similar, but not congruent, to  $\triangle XCD$ .
- (b) Find the length of  $EF$ .

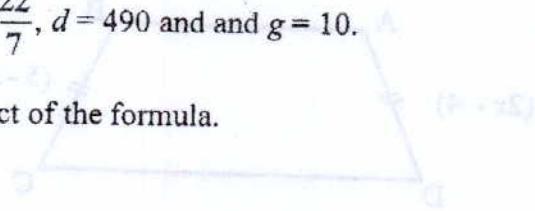
<i>Answer</i>	(a) (i) _____	[1]
	(ii) _____	[1]
	(b) _____	[2]

- 24 It is given that  $t = 2\pi \sqrt{\frac{d}{g}}$ .

(a) Find  $t$  when  $\pi = \frac{22}{7}$ ,  $d = 490$  and  $g = 10$ .

(b) Make  $d$  the subject of the formula.

For  
Examiner's  
Use



$\text{Exterior angle } \angle BCA = \angle BAC + \angle ABC$

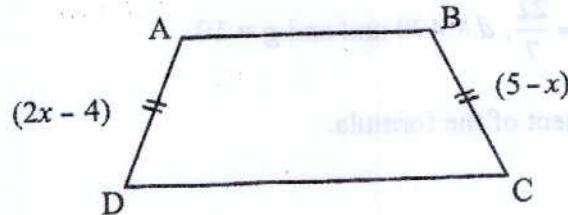
$$\text{Exterior angle } \angle BCA = 45^\circ \text{ (given)} \quad (\text{c})$$

$$\text{Exterior angle } \angle BCA = \angle BAC + \angle ABC = (x + 5) + (2x - 15) = 3x - 10 \quad (\text{d})$$

Answer (a)  $t = \underline{\hspace{2cm}}$  [2]

(b)  $d = \underline{\hspace{2cm}}$  [2]

25

ABCD is an isosceles trapezium with  $AD = BC$ .

- (a) Given that  $AD = (2x - 4) \text{ cm}$  and  $BC = (5 - x) \text{ cm}$ , form an equation in  $x$  and solve it.
- (b) Given also that  $AB = (2x + 6) \text{ cm}$  and  $DC = 14 \text{ cm}$ , find the numerical value of the perimeter of the trapezium.

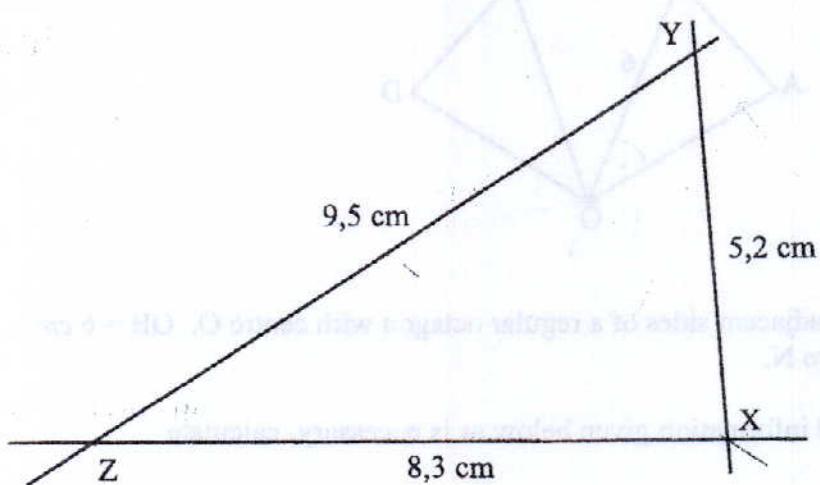
Answer (a) Equation: \_\_\_\_\_ [1]

 $x =$  \_\_\_\_\_ [1]

(b) \_\_\_\_\_ cm [2]

26

27

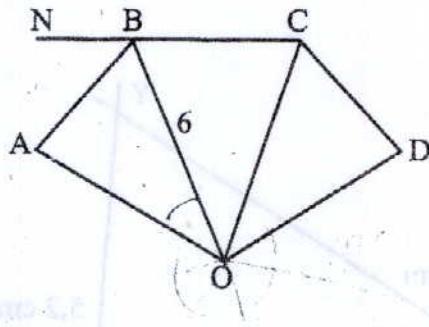
For  
Examiner's  
Use

On the diagram, use ruler and compasses only to construct

- the perpendicular from X to YZ,
- the locus of points 2,2 cm from YZ and on the same side of YZ as X.

*Answer* (a) on diagram [2]

(b) on diagram [2]



For  
Examiner's  
Use

AB, BC and CD are adjacent sides of a regular octagon with centre O. OB = 6 cm and CB is produced to N.

Using as much of the information given below as is necessary, calculate

- (a)  $N\hat{B}A$ ,
- (b)  $A\hat{O}B$ ,
- (c) the area of  $\Delta AOB$ .

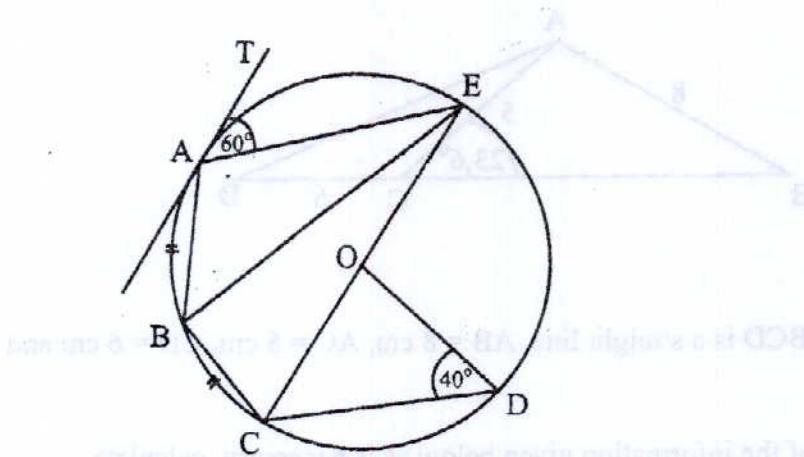
$[\sin 45^\circ = \cos 45^\circ = 0.7; \tan 45^\circ = 1]$

Answer

(a)  $N\hat{B}A =$  \_\_\_\_\_ [1]

(b)  $A\hat{O}B =$  \_\_\_\_\_ [1]

(c) Area of  $\Delta AOB =$  \_\_\_\_\_  $cm^2$  [2]



In the diagram, COE is a diameter of the circle ABCDE, centre O and TA is a tangent to the circle at A.  $\hat{TAE} = 60^\circ$ ,  $\hat{ODC} = 40^\circ$  and arc AB = arc BC. Find

- (a)  $\hat{CBE}$ ,
- (b)  $\hat{ABE}$ ,
- (c)  $\hat{BEC}$ ,
- (d)  $\hat{EOD}$ .

Answer

(a)  $\hat{CBE} = \underline{\hspace{2cm}}$  [1]

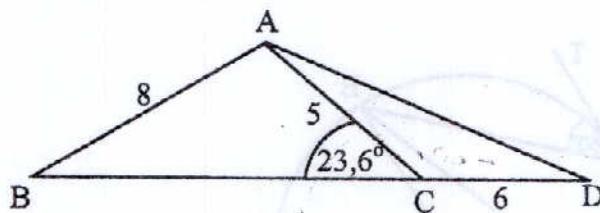
(b)  $\hat{ABE} = \underline{\hspace{2cm}}$  [1]

(c)  $\hat{BEC} = \underline{\hspace{2cm}}$  [2]

(d)  $\hat{EOD} = \underline{\hspace{2cm}}$  [1]

30

29



In the diagram,  $BCD$  is a straight line,  $AB = 8 \text{ cm}$ ,  $AC = 5 \text{ cm}$ ,  $CD = 6 \text{ cm}$  and  $\hat{A}CB = 23,6^\circ$ .

Using as much of the information given below as is necessary, calculate.

- (a) the value of  $\sin A\hat{B}C$ , giving your answer as a common fraction in its lowest terms,
- (b)  $AD^2$ .

$[\sin 23,6^\circ = 0,40; \cos 23,6^\circ = 0,92; \tan 23,6^\circ = 0,44]$ .

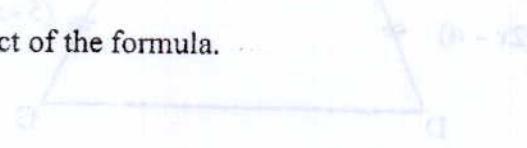
Answer (a)  $\sin A\hat{B}C = \underline{\hspace{2cm}}$  [2]

(b)  $AD^2 = \underline{\hspace{2cm}}$  [3]

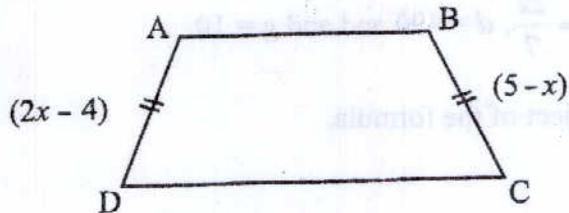
24 It is given that  $t = 2\pi \sqrt{\frac{d}{g}}$ .

(a) Find  $t$  when  $\pi = \frac{22}{7}$ ,  $d = 490$  and  $g = 10$ .

(b) Make  $d$  the subject of the formula.



- Answer*
- (a)  $t = \frac{2}{\sqrt{\frac{d}{g}}}$  [2]
- (b)  $d = \frac{2}{t^2 g}$  [2]



ABCD is an isosceles trapezium with  $AD = BC$ .

- (a) Given that  $AD = (2x - 4) \text{ cm}$  and  $BC = (5 - x) \text{ cm}$ , form an equation in  $x$  and solve it.
- (b) Given also that  $AB = (2x + 6) \text{ cm}$  and  $DC = 14 \text{ cm}$ , find the numerical value of the perimeter of the trapezium.

Answer (a) Equation: \_\_\_\_\_ [1]

$x =$  \_\_\_\_\_ [1]

(b) \_\_\_\_\_ cm [2]