SECTION A: TRIGONOMETRY

Question 1 [4 x 2 = 8]

Give a short answer to the following questions:

Question	Answer
Find the exact value of the trigonometric function: $\sin^{-1}(-1)$	
Find the exact value of the trigonometric function: $\cos\frac{2\pi}{3}$	
Convert to radian measure: $-75°$	
Find a negative angle that is co-terminal with : $\frac{\pi}{5}$	

Question 2 [5 X 2 = 10]

The following questions are multiple choice questions. There is only one correct answer from the choices given. Select the correct option by marking the option with an **X**.

MARK YOUR ANSWERS HERE:

2.1	**A**	**B**	**C**	**D**	**E**
2.2	**A**	**B**	**C**	**D**	**E**
2.3	**A**	**B**	**C**	**D**	**E**
2.4	**A**	**B**	**C**	**D**	**E**
2.5	**A**	**B**	**C**	**D**	**E**

2.1 In $\Delta ABC,\ AC = BC.$ Which statement is FALSE?

A. $a = \frac{b \sin A}{\sin B}$

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

C. $a = \frac{c \sin B}{\sin C}$

D. $b = \frac{a \sin B}{\sin C}$

E. They are all true.

2.2 $\sec(2\pi - \theta).\sin\left(\frac{\pi}{2} - \theta\right) =$

A. 1

B. $cos^2\,\theta$

C. -1

D. $\frac{csc\,\theta}{\cos\theta}$

E. None of these

2.3 If $5\sin x - 4 = 0$ and $x \in \left[\frac{\pi}{2}\,;2\pi\right]$, then $\cot x =$

A. $\frac{3}{4}$

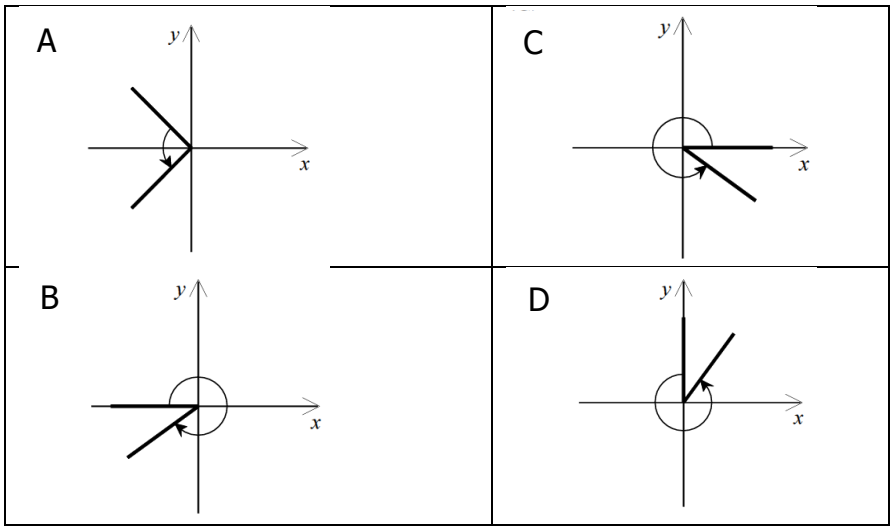
B. $\frac{-3}{4}$

C. $\frac{5}{4}$

D. $\frac{-4}{3}$

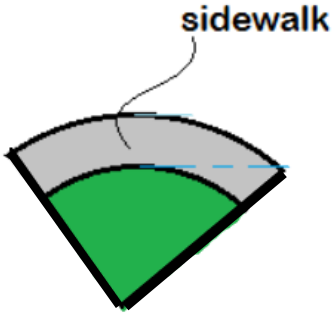
E. None of these

2.4 Identify the angle that is in standard position



E. None of these

2.5 Grass is planted in the shape of an arc along a circular sidewalk. If the circle has a radius of 5,5 m and the angle subtended by the arc measures $\frac{\pi}{5}$ radians, what is the length of the border?



A. $1{,}1\pi$ m

B. $\frac{\pi}{27{,}5}$ m

C. $\frac{55\pi}{2}$ m

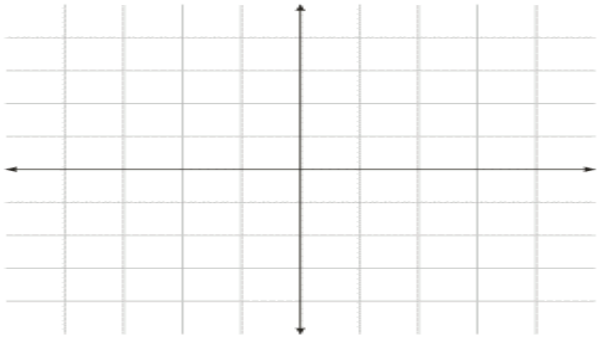
D. $\frac{2\pi}{55}$ m

E. None of these

Question 3 [5]

a. Graph the function (use the provided set of axes). Show clear readings on both axes

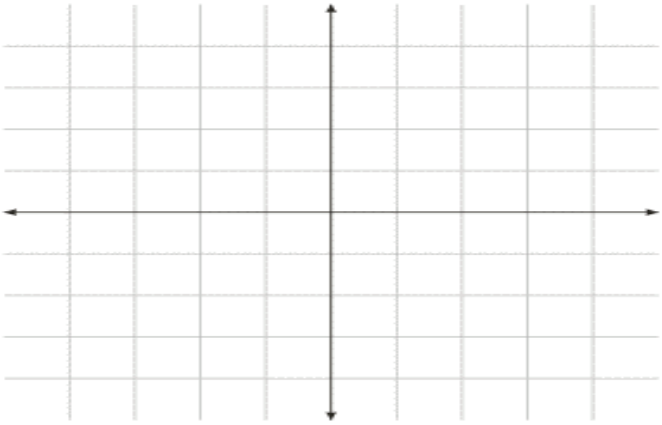
$$y = \csc x \ ; \ \ x \in [-\pi; 2\pi]$$



(3)

b. Graph the function (use the provided set of axes). Show clear readings on both axes.

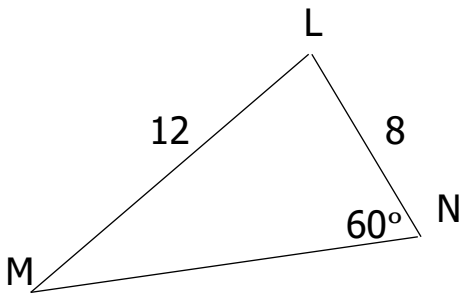
$$y = tan^{-1} x$$



(2)

Question 4 [11]

4.1 In the figure, LMN is a triangle with LM = 12 units, LN = 8 units and $\widehat{N} = 60°$.
Show that:



a. $\sin M = \sin\ (L + N)$

(2)

b. $\sin(L + N) = \frac{1}{\sqrt{3}}$

(3)

4.2 Given: $\sin\alpha = \frac{1}{4}$, where $90° \leq \alpha \leq 270°$
With the aid of a sketch, calculate:

a. $\sin(90° + \alpha)$

(3)

b. $\cos 2\alpha$

(3)

Question 5 [5]

Find the general solution of $\sin\left(2x - \frac{\pi}{3}\right) = \frac{1}{2}$

Total Trigonometry: 40

SECTION B: GEOMETRY

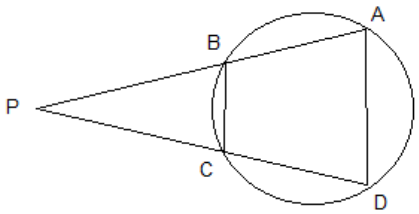
Question 6 [5 x 2 = 10]

The following questions are multiple choice questions. There is only one correct answer from the choices given. Select the correct option by marking the option with an **X**.

MARK YOUR ANSWERS HERE:

6 .1	**A**	**B**	**C**	**D**	**E**
6.2	**A**	**B**	**C**	**D**	**E**
6.3	**A**	**B**	**C**	**D**	**E**
6.4	**A**	**B**	**C**	**D**	**E**
6.5	**A**	**B**	**C**	**D**	**E**

6.1 Which statement is FALSE?



A. $\Delta PCB \,|||\Delta PAD$

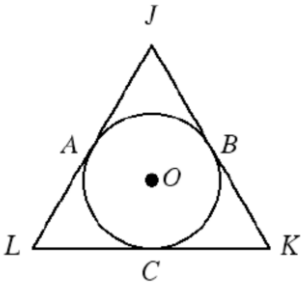
B. $\frac{PC}{PA} = \frac{PB}{PD}$

C. $PB.PD = CB.AD$

D. $CB.PA = PC.AD$

E. They are all true.

6.2 JK, KL and LJ are all tangents to circle 0. JA = 9cm, AL = 10cm and CK = 14 cm. Find the perimeter of ΔJKL.



A. 66cm

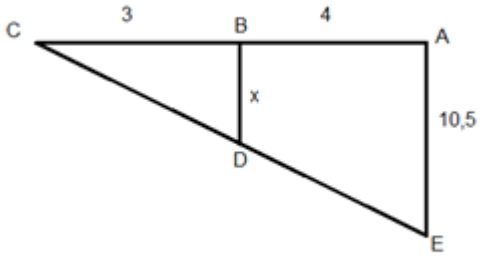
B. 46cm

C. 38cm

D. 23cm

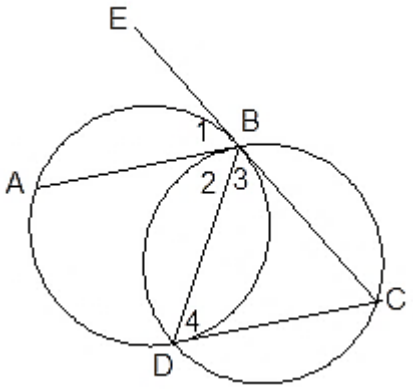
E. None of these

6.3 In the figure, AB = 4 , BC = 3 , AE = 10,5 , BD = x and BD ∥ AE.
x = …..



A. 1,5
B. 3,5
C. 4,5
D. 5,25
E. None of these

6.4 In the figure, AB, CD, BD and CE are straight lines. If AB is parallel to CD then ΔBDC will be isosceles if …



A. EC is a tangent to circle ABD
B. BC = AB
C. AB = BD
D. AB is a tangent to circle BCD
E. None of these

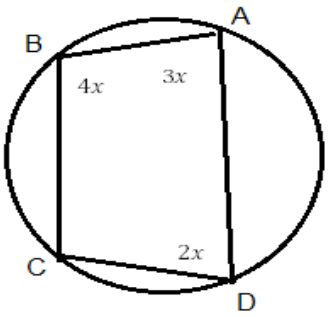
6.5 What can we say about the base angles of any isosceles triangle?

A. They must be acute angles.
B. They must be obtuse angles.
C. They must be right angles.
D. Their size depend on the length of the equal sides.
E. None of these.

Question 7 [4]

Answer the following True or False questions and give a short justification / counter-example:

a) If $\hat{A} = 3x,\ \hat{B} = 4x,\ \hat{D} = 2x,$ *then* $x = 30°$



TRUE	
FALSE	

(2)

b) A radius is always perpendicular to a chord.

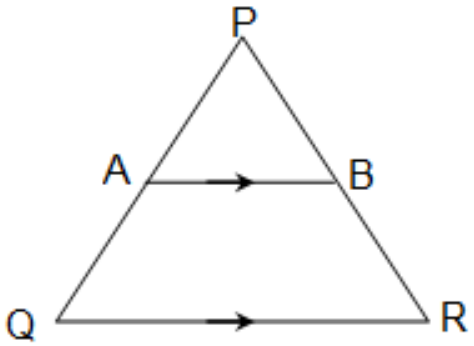
TRUE	
FALSE	

(2)

Question 8 [10]

8.1 Use the accompanying figure and answer the questions regarding the proof of the theorem that states:

A line parallel to one side of a triangle divides the other two sides in the same proportion.



a) Describe, in words, the necessary construction, and show this on the sketch above.

(2)

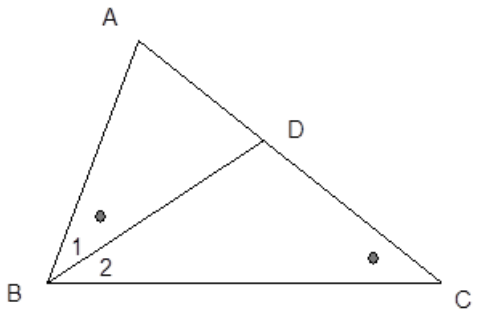
b) Why is $area\ \Delta ABQ = area\ \Delta ABR$?

(2)

8.2 In ΔABC, DB is drawn and

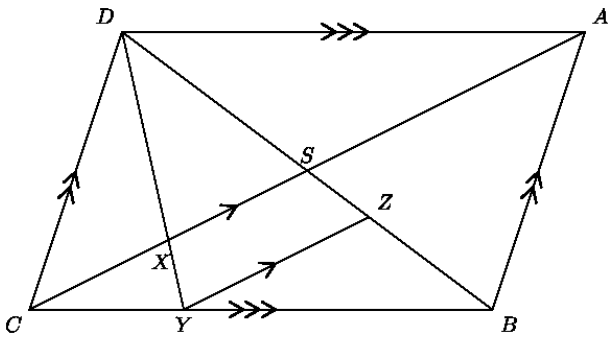
$\hat{B}_1 = \hat{C}$.

Prove that $AB^2 = AC \times AD$



(3)

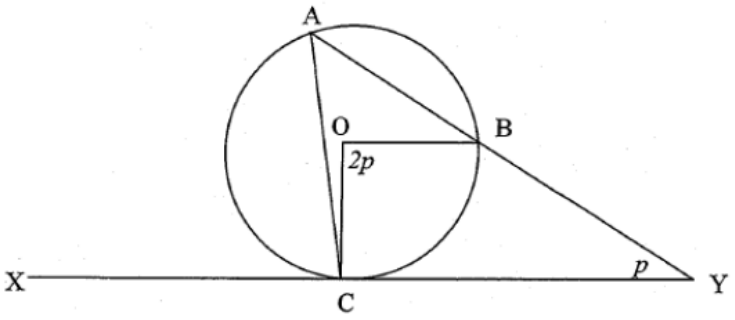
8.3 Given: $\frac{CY}{CB} = \frac{2}{5}$. Find $\frac{DS}{SZ}$, giving reasons for your statements.



(3)

Question 9 [4]

XCY is a tangent to the circle with centre O. $C\hat{O}B = 2p$ and $B\hat{Y}C = p$. Determine, in terms of p, the following angles:



a) $B\hat{A}C$

(1)

b) $X\hat{C}A$

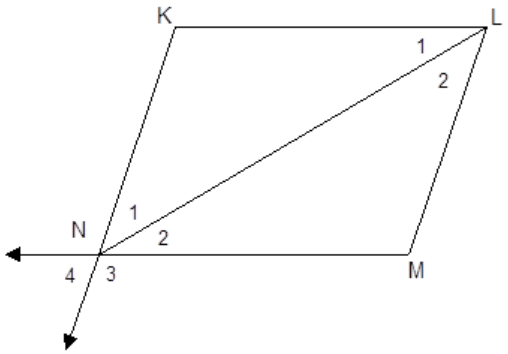
(2)

c) $A\hat{C}O$

(1)

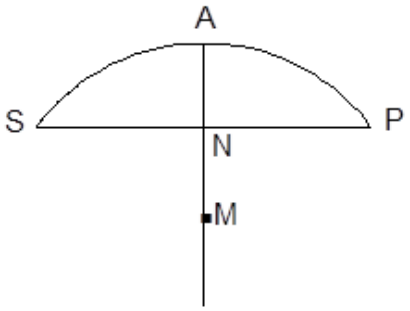
Question 10 [7]

a. Given:
$\hat{L}_1 = \hat{L}_2 = 30^o$, $\hat{N}_4 = 60^o$ and $KL \| NM$.
Prove, stating reasons, that $KN \| LM$.



(4)

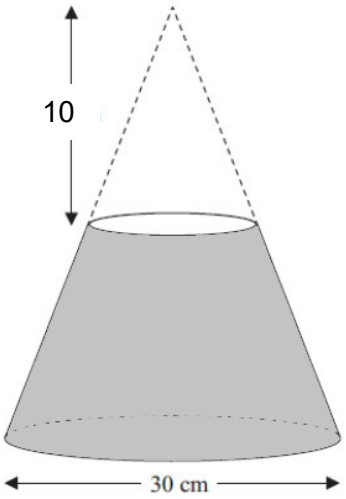
b. SAP represents the span of the dome of a roof of a shopping centre. The dome forms an arc of a circle with centre, M. The length of SP is 24 metres. The height, AN, of the dome is 4 metres. ANM $\perp$ SP.
Calculate the radius of the circle with arc SAP.



(3)

Question 11 [5]

A kettle 35 cm high has the shape of a truncated cone, see diagram:



- The height of the small cone is 10 cm.
- The radius of the base of the small cone is 4,5 cm.
- The diameter of the base of the kettle is 30 cm.

(The diagram is not drawn to scale.)

Work out the volume of the kettle. Give your answer in terms of π.

(Hint: volume of a cone = $\frac{1}{3}$ area of base $\times \perp h$)

Total Geometry: 40