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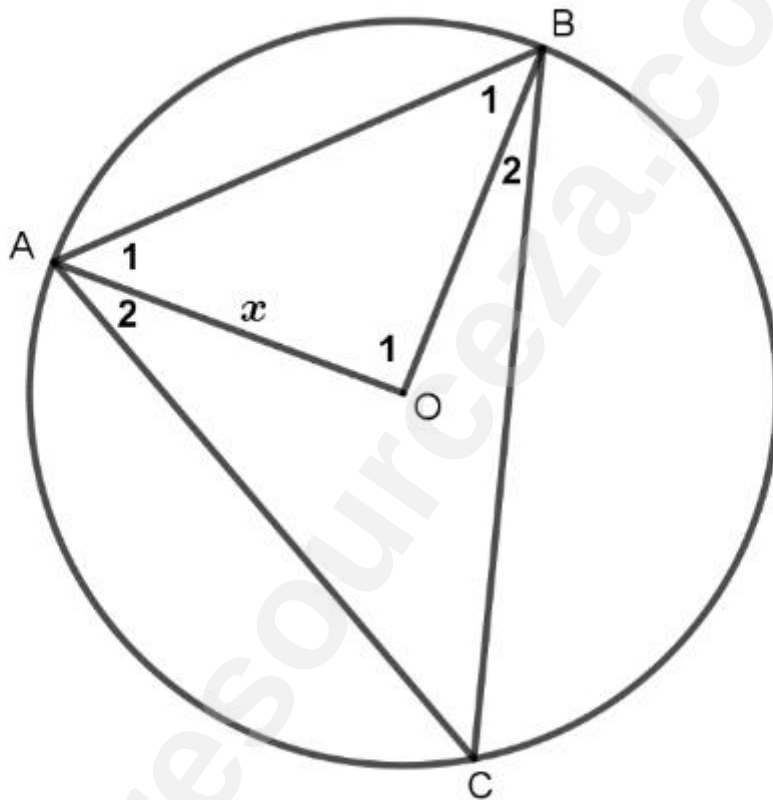
## GN (DI) STRATEGY FOR LEARNERS ATTAINMENT

## TOPIC REVISION\_EUCLIDEAN GEOMETRY

## PREP 2020\_FREE STATE

## QUESTION 9

A, B and C are three points on the circle with centre O such that  $AB = BC = \frac{3}{2} AO$ .  
 $AO = x$ .



- 9.1 Calculate the size of  $\hat{O}_1$  rounded off to the nearest degree. (5)
- 9.2 If  $\hat{O}_1 = 97^\circ$  and  $x = 10$  cm, calculate the length of AC correct to two decimal places. (4)

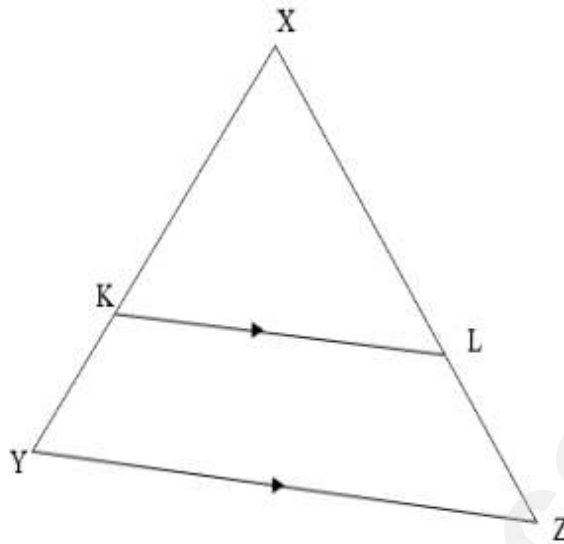
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|       |             |     |
|-------|-------------|-----|
| 9.3.1 | $\hat{Q}_1$ | (2) |
| 9.3.2 | $\hat{P}_4$ | (2) |
| 9.3.3 | $\hat{M}_1$ | (2) |
| 9.3.4 | $\hat{R}$   | (4) |

### QUESTION 10

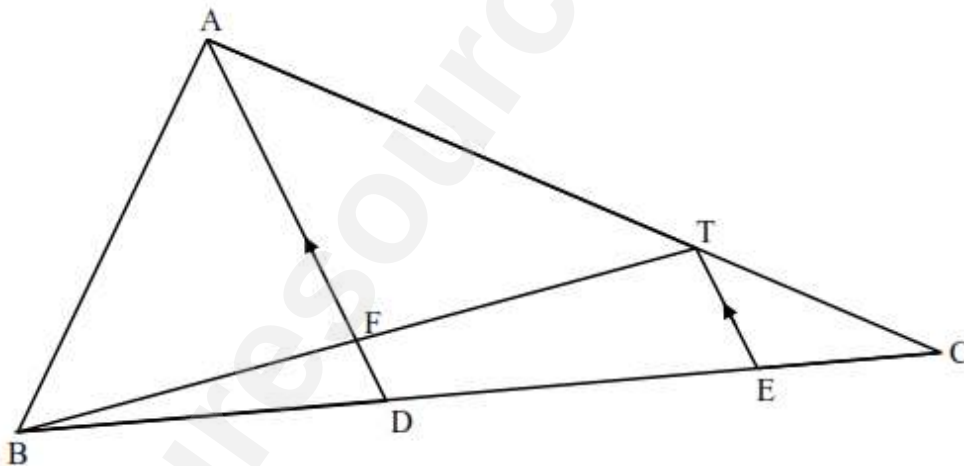
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(6)

- 10.3 In the figure, D is a point on side BC of  $\triangle ABC$  such that  $BD = 6$  cm and  $DC = 9$  cm. T and E are points on AC and DC respectively such that  $TE \parallel AD$  and  $AT : TC = 2 : 1$



- 10.3.1 Show that D is the midpoint of BE. (3)
- 10.3.2 If  $FD = 2$  cm, calculate the length of TE. (3)
- 10.3.3 Calculate the numerical value of:

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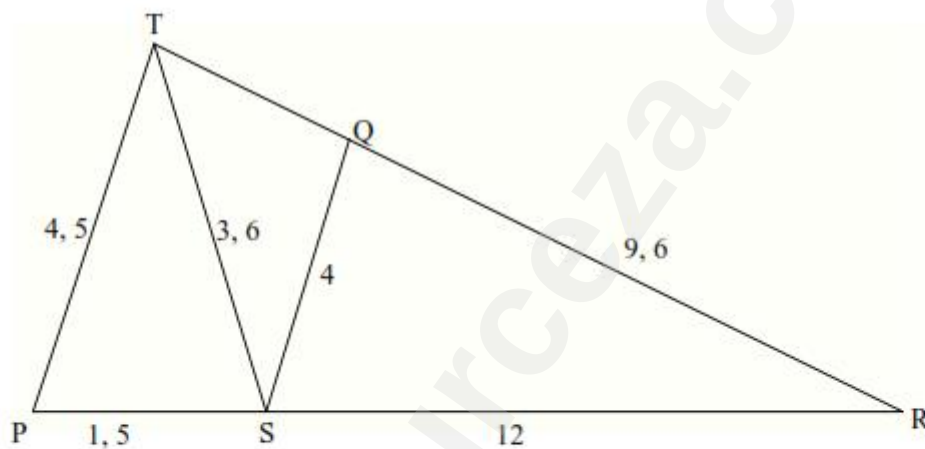
$$(a) \frac{\text{Area of } \triangle ADC}{\text{Area of } \triangle ABD} \quad (3)$$

$$(b) \frac{\text{Area of } \triangle TEC}{\text{Area of } \triangle ABC} \quad (3)$$

[19]

## QUESTION 11

In the diagram, TPR is a triangle with TP = 4,5 units. Points Q and S are on TR and PR respectively such that QR = 9,6 units, QS = 4 units, TS = 3,6 units, PS = 1,5 units and SR = 12 units.



11.1 Prove that PT is a tangent to the circle which passes through the points T, S and R. (7)

11.2 Calculate the length of TQ. (5)  
[12]

## PREP 2020\_NORTH WEST

Give reasons for your statements in QUESTIONS 8, 9 and 10.

## QUESTION 8

In the diagram, O is the centre of the circle with radius OC. ABCD is a cyclic quadrilateral. N is another point on the circle such that  $ON \parallel BC$ . Chord DN is drawn. OE bisects chord BC at E. GC is a tangent to the circle at C. ON and GC are produced to meet in F.  $\hat{OCE} = 20^\circ$  and  $\hat{DAB} = 150^\circ$ .



- 8.1.4
- $\hat{D}_2$
- (4)

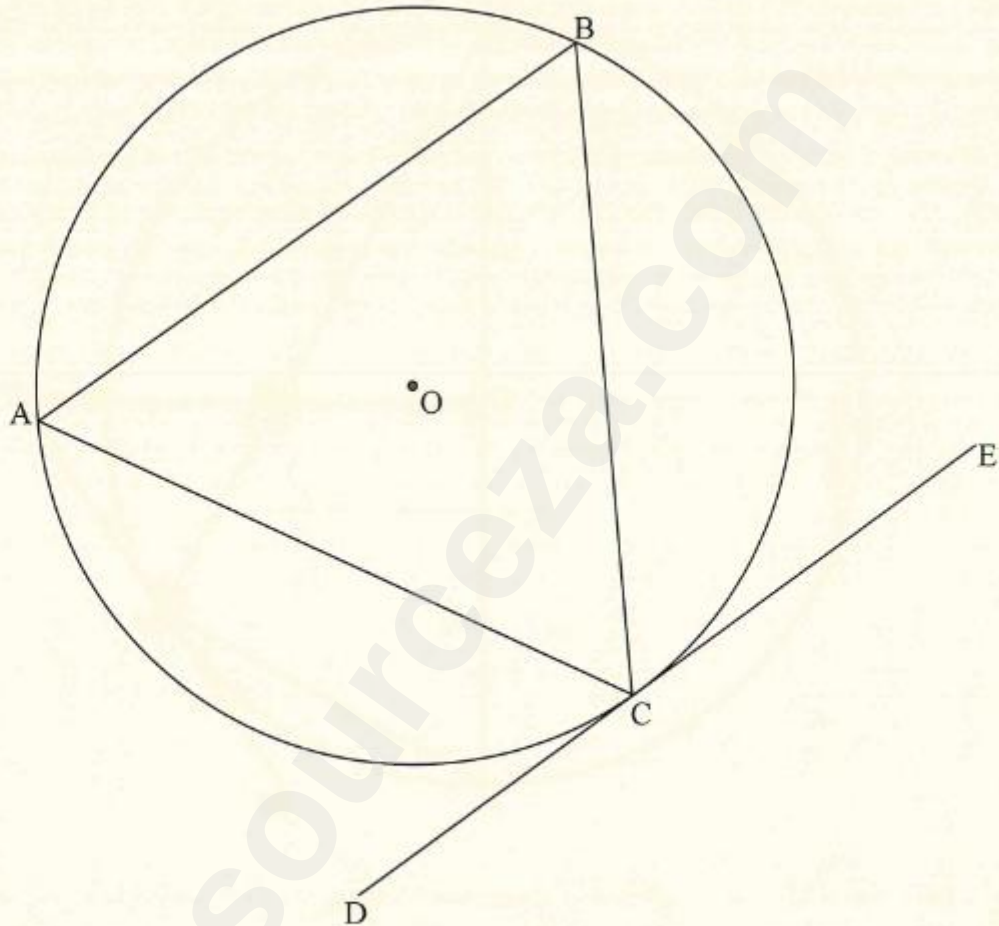
- (5)  
[14]

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## GN (DI) STRATEGY FOR LEARNERS ATTAINMENT

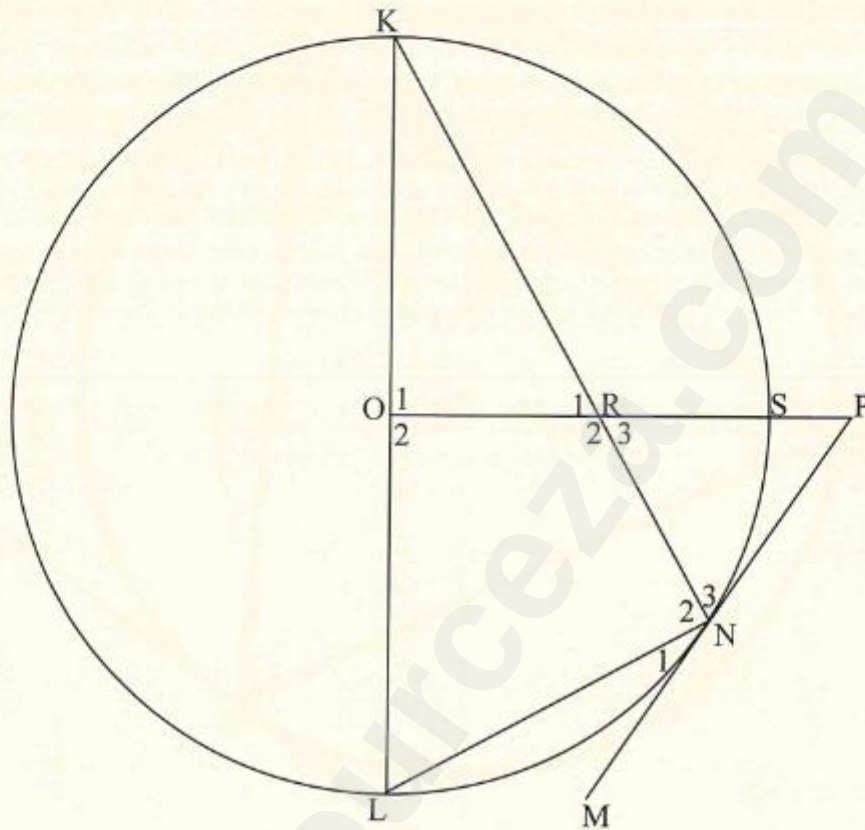
### QUESTION 9

- 9.1 In the diagram, chords AB, BC and AC are drawn in the circle with centre O. DCE is the tangent to the circle at C.



Prove the theorem which states that  $\hat{ACD} = \hat{ABC}$  (5)

- 9.2 In the diagram below, the centre of the circle is O with the diameter KL. MNP is a tangent to the circle at N. Chords KN and LN are drawn. R is a point on KN and ORSP forms a straight line. OP = 15 units.



- 9.2.1 Give the length of OR if  $OR : RP = 2 : 3$ . (1)
- 9.2.2 It is given that  $KR^2 - KO^2 = 36$ . Prove that  $OR \perp KL$ . (2)
- 9.2.3 Prove that ORNL is a cyclic quadrilateral. (3)
- 9.2.4 MNP is translated to the left side of the circle, such that  $M'$  falls outside of the circle and  $N'$  inside of the circle. The point  $P'$  coincides with the point S. The points O, L and S remain fixed as indicated on the original diagram and  $MNP \parallel M'N'P'$ . Is it possible for  $M'N'P'$  to be a tangent to the circle drawn through O, L and S? Motivate your answer. (4)

[15]

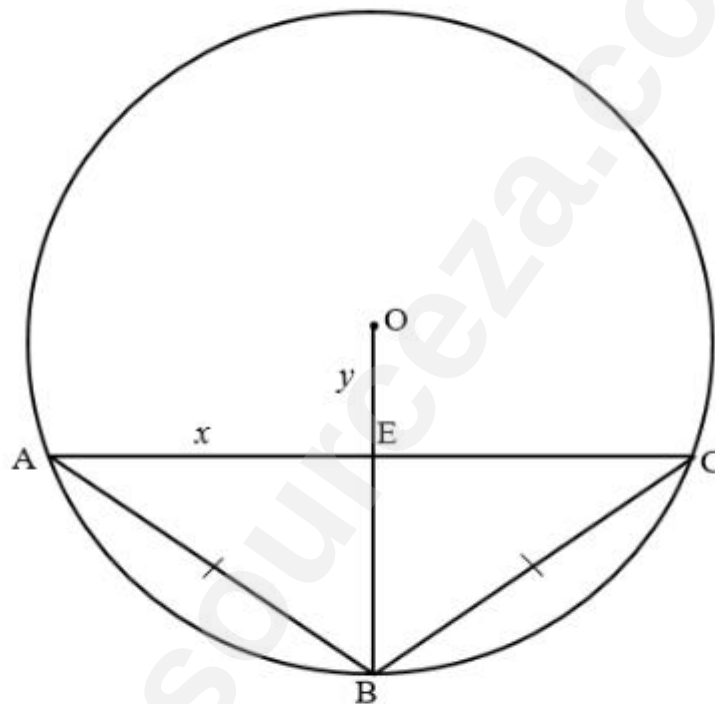
PREP 2020\_E. CAPE

QUESTION 8

8.1 Complete the following theorem statement:

*The line drawn from the centre of a circle perpendicular to a chord ...* (1)

8.2 In the diagram below, circle ABC with centre O is given.  $OB = 8$  units and  $AB = BC = 10$  units. E is the midpoint of AC. Let  $OE = y$  and  $AE = x$ .



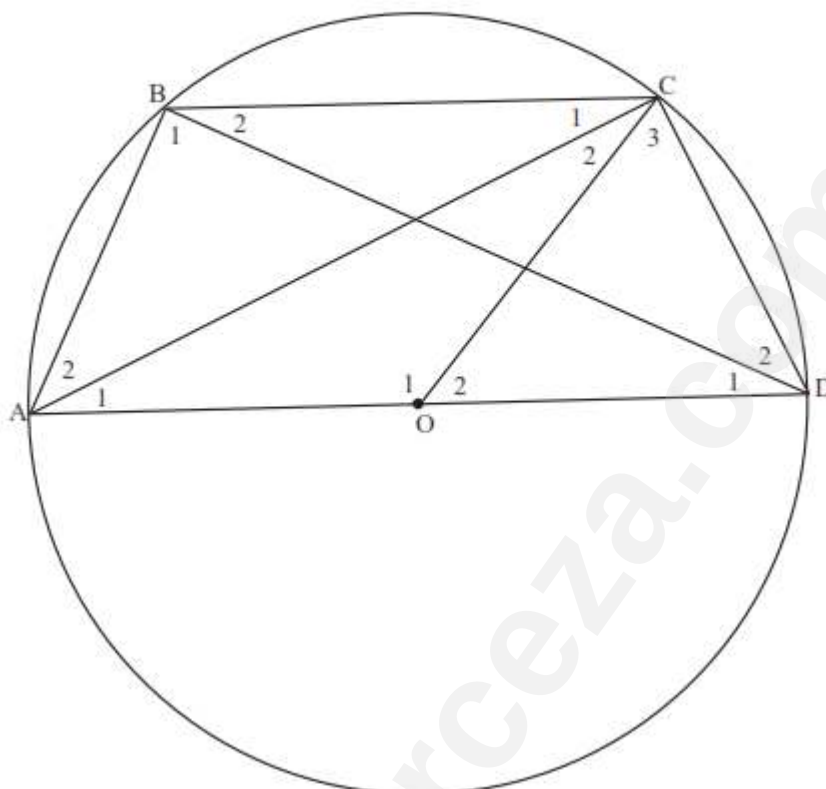
Calculate, with reasons, the length of OE. (5)

8.3 Complete the following theorem statement:

*The angle subtended by an arc at the centre of a circle is ... at the circle (on the same side of the chord as the centre).* (1)

# GN (DI) STRATEGY FOR LEARNERS ATTAINMENT

- 8.4 In the diagram, O is the centre of a circle ABCD. AOD is the diameter and OC is a radius. AB, BC, CD, AC and BD are straight lines.



Write down, with reasons, an equation that expresses the relationship between each of the given groups of angles.

|       | ANGLES                                       | EQUATION /<br>RELATIONSHIP     | REASON                                            |
|-------|----------------------------------------------|--------------------------------|---------------------------------------------------|
| e.g.  | $\hat{M}_3; \hat{P}$                         | $\hat{M}_3 = 2 \times \hat{P}$ | $\angle$ at centre = $2 \times \angle$ at circum. |
| 8.4.1 | $\hat{O}_2; \hat{B}_2$                       |                                |                                                   |
| 8.4.2 | $\hat{D}_1; \hat{C}_3; \hat{D}_2$            |                                |                                                   |
| 8.4.3 | $\hat{B}_1; \hat{B}_2; \hat{D}_1; \hat{D}_2$ |                                |                                                   |
| 8.4.4 | $\hat{D}_1; \hat{C}_1$                       |                                |                                                   |

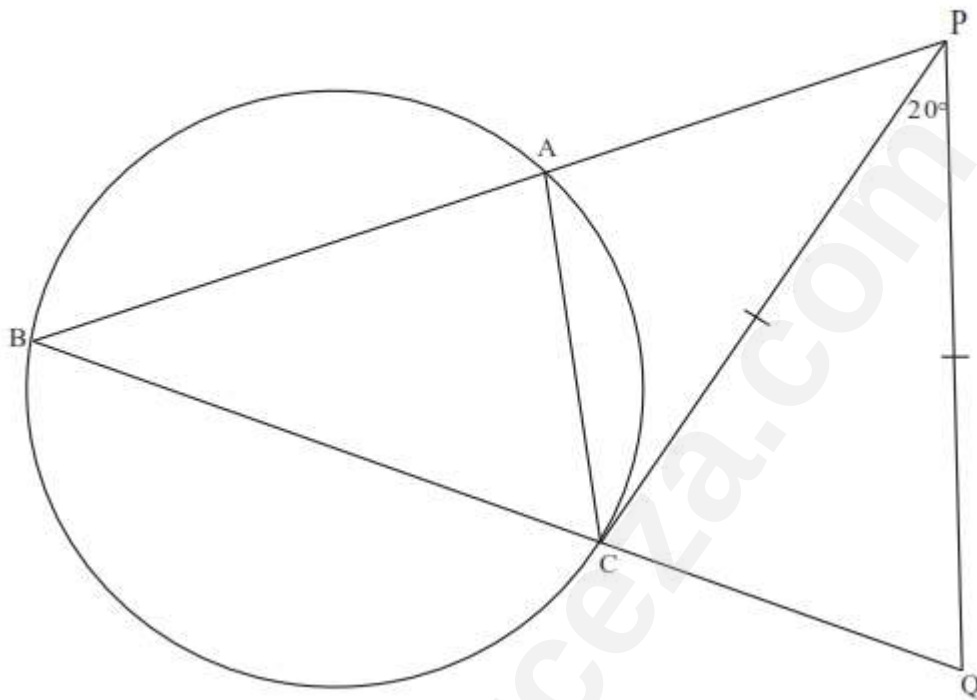
(8)  
[15]

# GN (DI) STRATEGY FOR LEARNERS ATTAINMENT

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## QUESTION 9

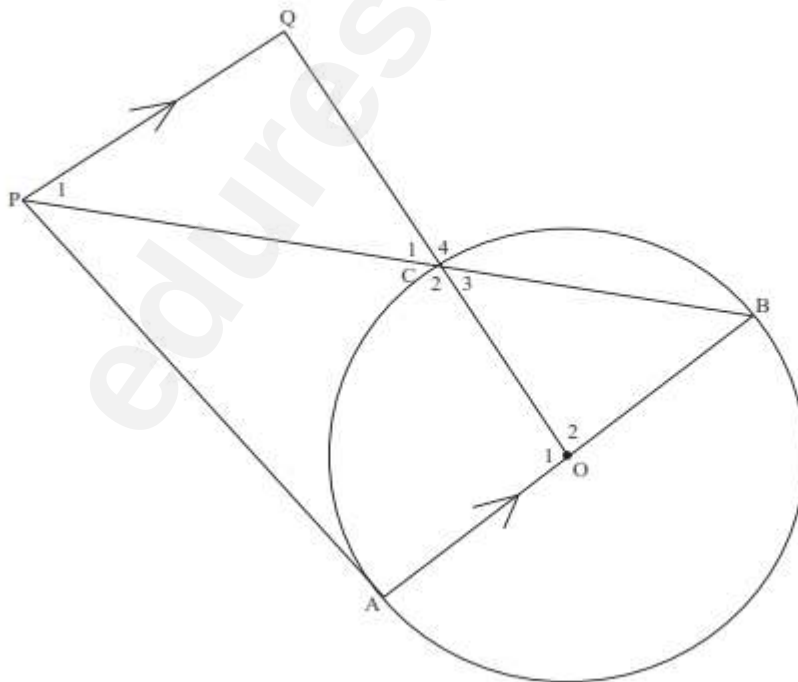
- 9.1 Given that PC is a tangent to the circle ACB; BAP and BCQ are straight lines.  
 $PC = PQ$  and  $\angle CPQ = 20^\circ$ .



Prove, stating reasons, that BC is NOT a diameter.

(5)

- 9.2 In the diagram below, O is the centre of circle ABC. The tangent PA to the circle and diameter AB meets at A. OCQ and BCP are straight lines.  $PQ \parallel AB$ .



Prove, stating reasons, that  $PQ = QC$ .

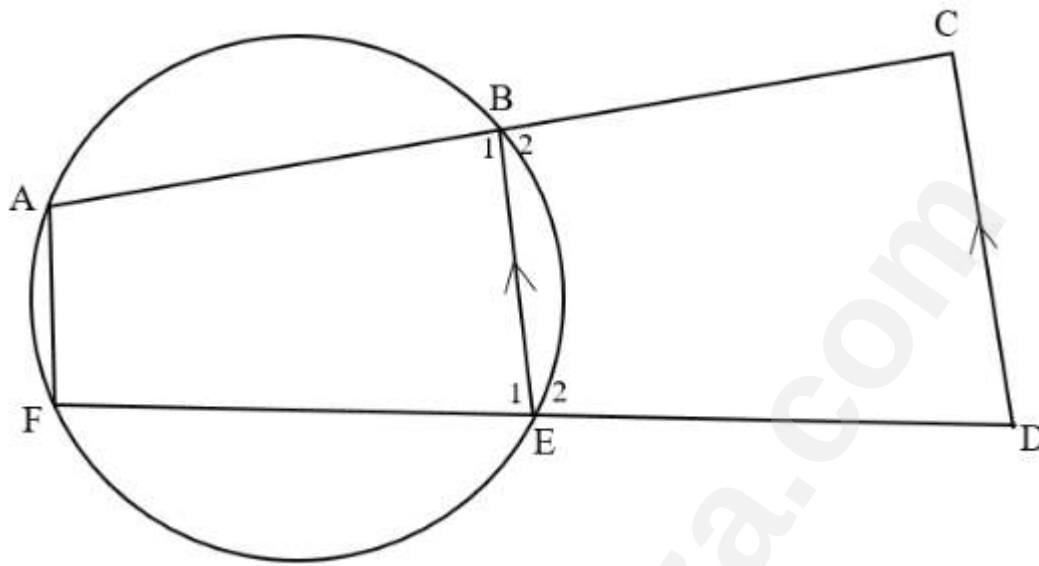
(6)

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## GN (DI) STRATEGY FOR LEARNERS ATTAINMENT

- 9.3 In the diagram below, chords AB and FE of circles with centre O are produced to points C and D.  $BE \parallel CD$ .

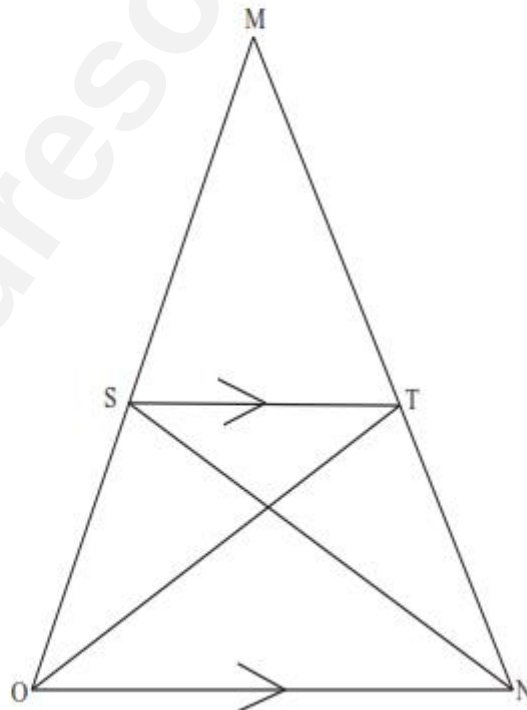


Prove that ACDF is a cyclic quadrilateral.

(5)  
[16]

### QUESTION 10

- 10.1 In the diagram,  $\triangle MON$  is drawn. S is a point on MO and T is a point on MN such that  $ST \parallel ON$ . SN and OT are drawn.



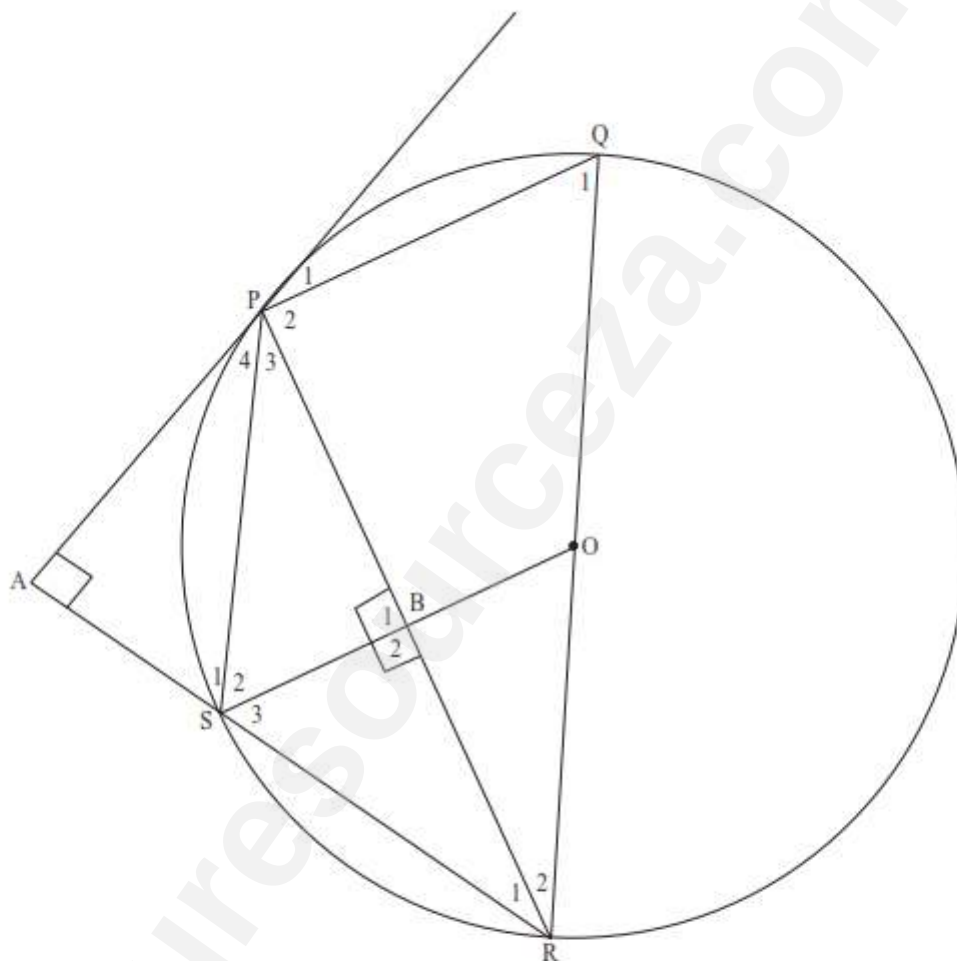
# GN (DI) STRATEGY FOR LEARNERS ATTAINMENT

Use the diagram to prove the theorem which states that a line parallel to one side of a triangle divides the other two sides proportionally. In other words, prove that:

$$\frac{MS}{SO} = \frac{MT}{TN}.$$

(5)

- 10.2 In the diagram, O is the centre of the circle. PQRS is a cyclic quadrilateral. The tangent through P intersects RS produced at A.  $OB \perp PR$  and  $PA \perp AS$ .



Prove that:

$$10.2.1 \quad \triangle APS \parallel \triangle BRS \quad (3)$$

$$10.2.2 \quad AP \cdot RS = BR \cdot PS \quad (1)$$

$$10.2.3 \quad \hat{P}_4 = \hat{R}_2 \quad (4)$$

$$10.2.4 \quad BR \cdot RQ = RS \cdot RP \quad (6)$$

[19]

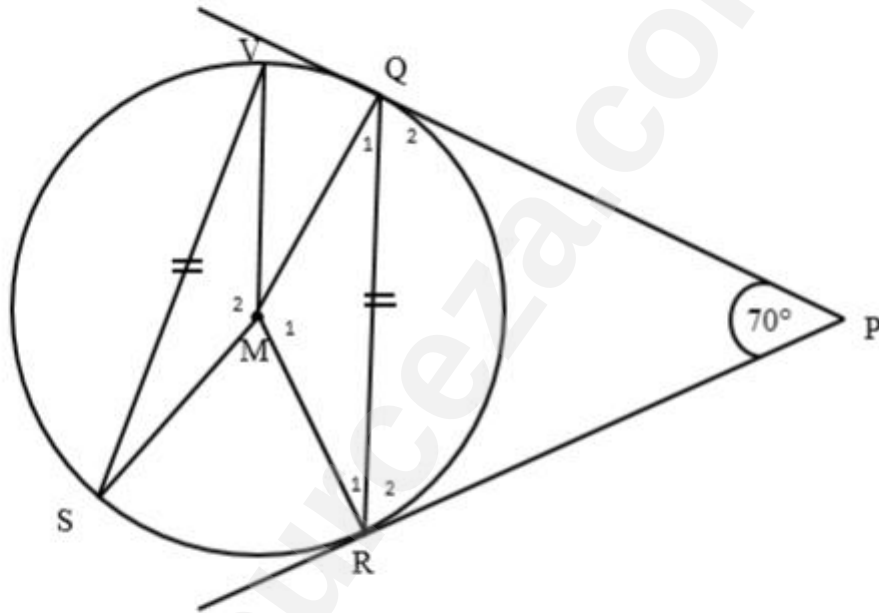
## GN (DI) STRATEGY FOR LEARNERS ATTAINMENT

## PREP 2020\_LIMPOPO

## QUESTION 8

8.1 M is the centre of the circle SVQR and SV and QR are equal chords.

RP and QP are tangents to the circle at R and Q respectively.  $\hat{RPQ} = 70^\circ$ .



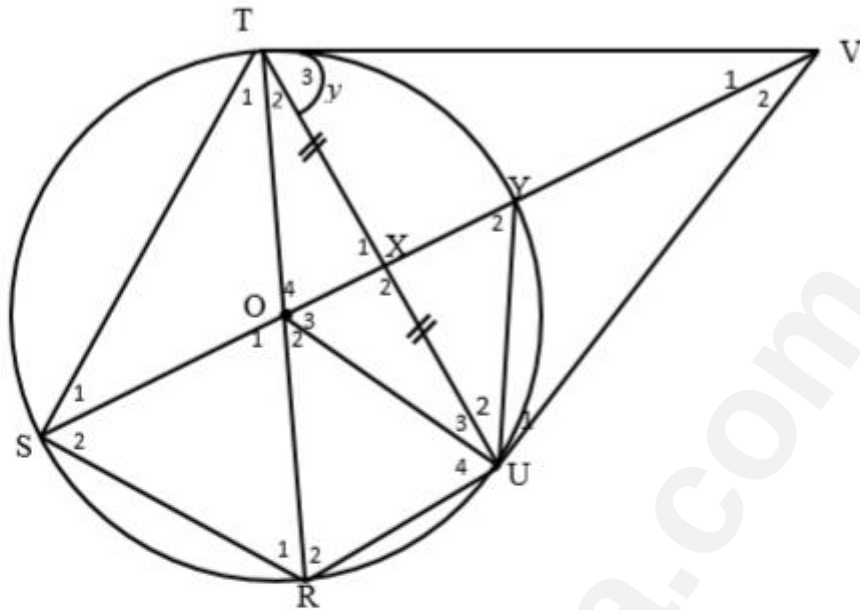
Calculate, giving reasons, the size of:

8.1.1  $\hat{R}_2$  (4)

8.1.2  $\hat{Q}_1$  (3)

8.1.3  $\hat{M}_2$  (3)

8.2 TV and VU are tangents to the circle with centre O at T and U respectively. TSRUY are points on the circle such that RT is the diameter. X is the midpoint of chord TU.  $\hat{T}_3 = y$ .



Prove that:

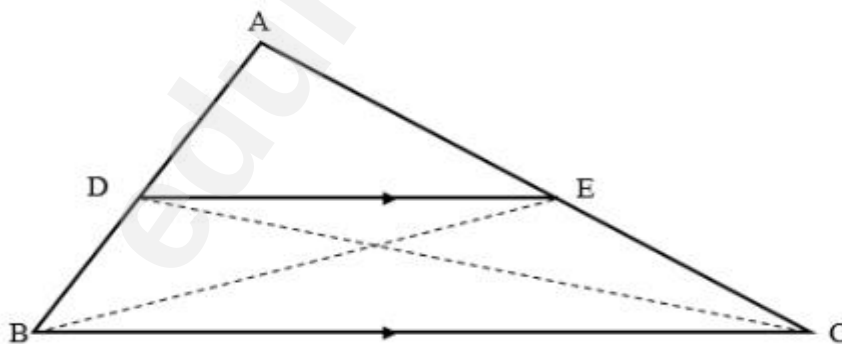
8.2.1  $RU \parallel SY$  (5)

8.2.2  $\hat{T}_1 = \frac{1}{2}y$  (5)

[20]

## QUESTION 9

- 9.1 In the diagram, points D and E lie on AB and AC respectively, such that  $DE \parallel BC$ . DC and BE are joined.

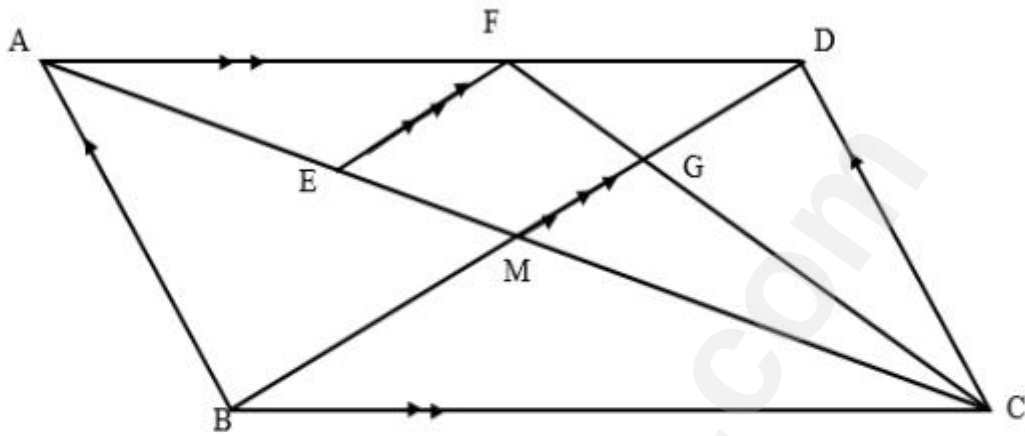


Use the diagram to prove the theorem which states that:

if  $DE \parallel BC$ , then  $\frac{AD}{DB} = \frac{AE}{EC}$ . (6)

# GN (DI) STRATEGY FOR LEARNERS ATTAINMENT

- 9.2 In the diagram ABCD is a parallelogram. The diagonals of ABCD intersect in M. F is a point on AD such that  $AF:FD = 4:3$ . E is a point on AM such that  $EF \parallel BD$ . FC and MD intersect in G.



Calculate, giving reasons:

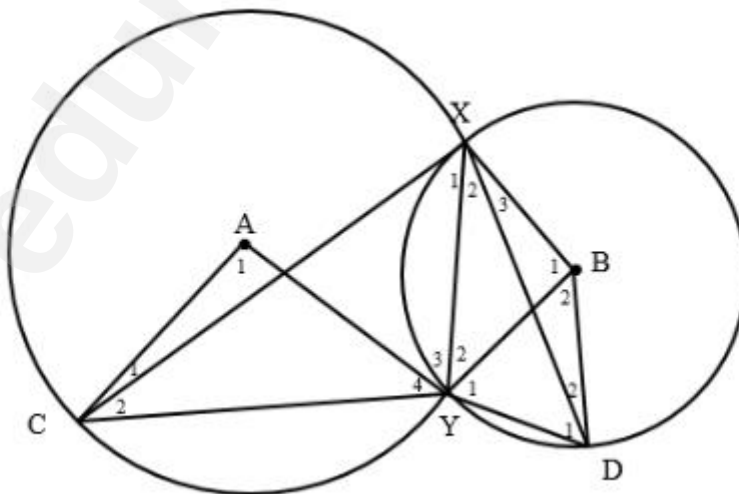
9.2.1  $\frac{EM}{AM}$  (3)

9.2.2  $\frac{CM}{ME}$  (3)

9.2.3  $\frac{\text{area } \Delta FDC}{\text{area } \Delta BDC}$  (4)

## QUESTION 10

Two circles with centres A and B, intersect at X and Y. The radius of circle A is R and the radius of circle B is r. CX is a tangent to circle B at X and DX is a tangent to circle A at X.



Prove that:

$$10.1 \quad \Delta X Y C \parallel \Delta D Y X \text{ and hence deduce that } X Y^2 = D Y \cdot Y C \quad (5)$$

$$10.2 \quad \hat{A}_i = \hat{B}_i \quad (4)$$

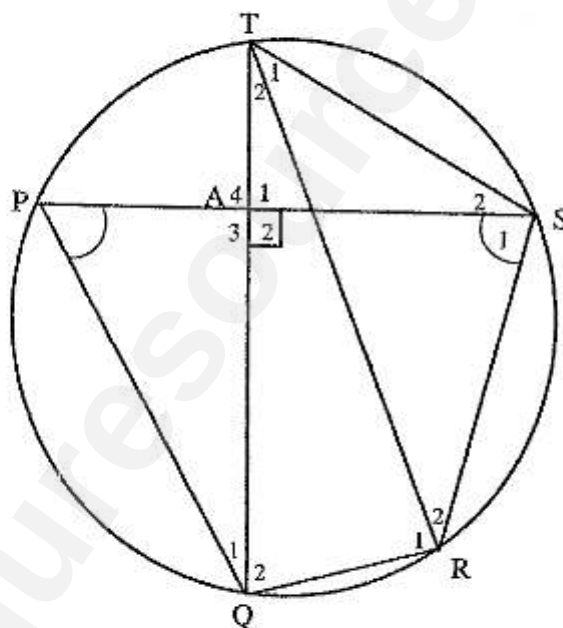
10.3 If  $\Delta CAY \parallel \Delta YBX$ , then  $\frac{r^2}{R^2} = \frac{DY}{CY}$  (5)

[14]

**PREP 2020 MPUMALANGA**

### QUESTION 8

In the diagram, TR is a chord of circle PQRST.  $QAT \perp PAS$ .  $QAT \perp PAS$  and  $\hat{P} = \hat{S}_1$ .  
In the following questions, give a reason for each statement.



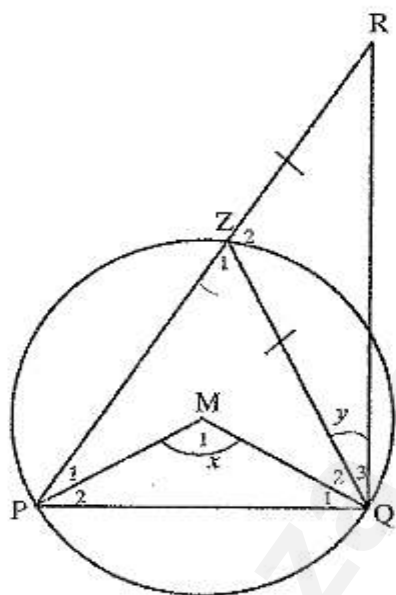
- 8.1 Name **three** angles with reasons, each equal to  $60^\circ$ . (4)
- 8.2 Calculate the size of  $\widehat{QRS}$ . (2)
- 8.3 Prove that  $PS \parallel QR$ . (2)
- 8.4 Prove that  $TR$  is a diameter of the circle. (3)

[11]

# GN (DI) STRATEGY FOR LEARNERS ATTAINMENT

## QUESTION 9

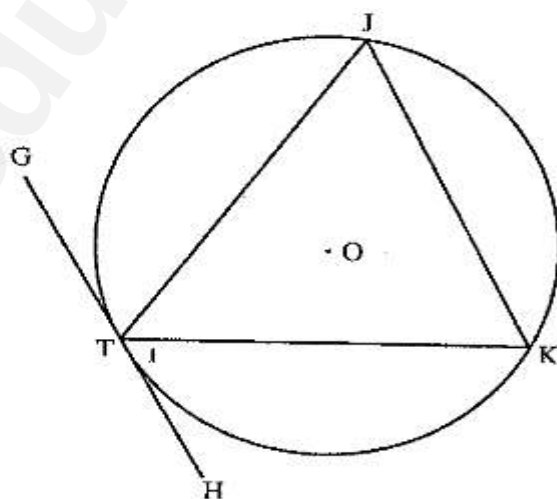
M is the centre of the circle.  $\hat{M}_1 = x$  and  $\hat{Q}_3 = y$ .  $ZR = ZQ$ .



- 9.1 Prove that  $x = 4y$ . (5)
- 9.2 If it is further given that  $\hat{P}_2 = \hat{R}$ , calculate the value of  $x$  and  $y$ . (6)
- [11]

## QUESTION 10

- 10.1 In the diagram O is the centre of the circle. GH is a tangent to the circle at T. J and K are points on the circumference of the circle. TJ, TK and JK are joined.

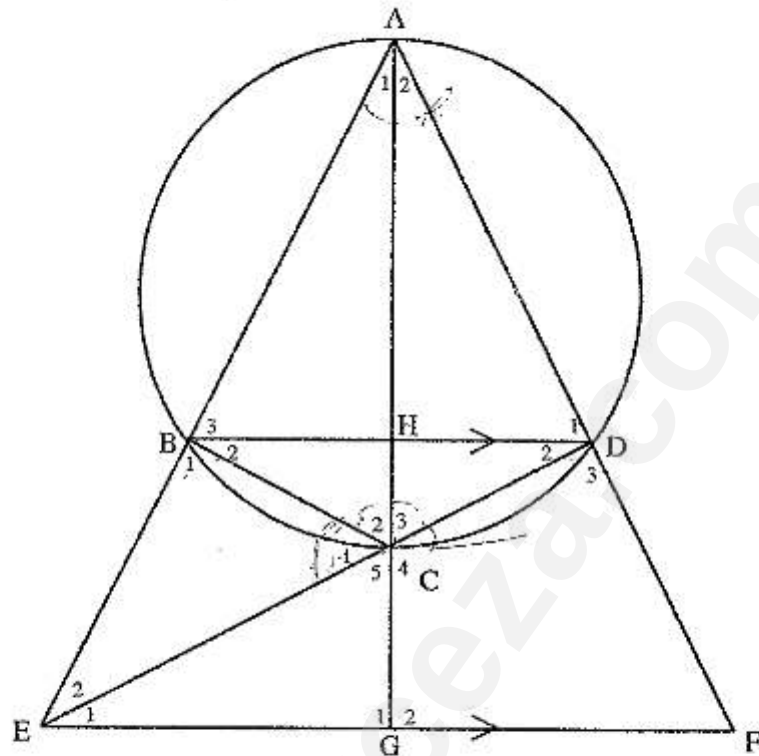


Prove the theorem that states  $\hat{T}_1 = \hat{TJK}$ .

(5)

# GN (DI) STRATEGY FOR LEARNERS ATTAINMENT

10.2 In the figure ABCD is a cyclic quadrilateral.  $EF \parallel BD$ , ACG and DCE are straight lines and BC is joined.



Prove that:

$$10.2.1 \quad EF \text{ is a tangent to circle } EAC. \quad (5)$$

$$10.2.2 \quad \triangle ABC \parallel \triangle EDF \quad (4)$$

$$10.2.3 \quad \frac{BE \cdot AH}{GH} = \frac{ED \cdot BC}{DF} \quad (6)$$

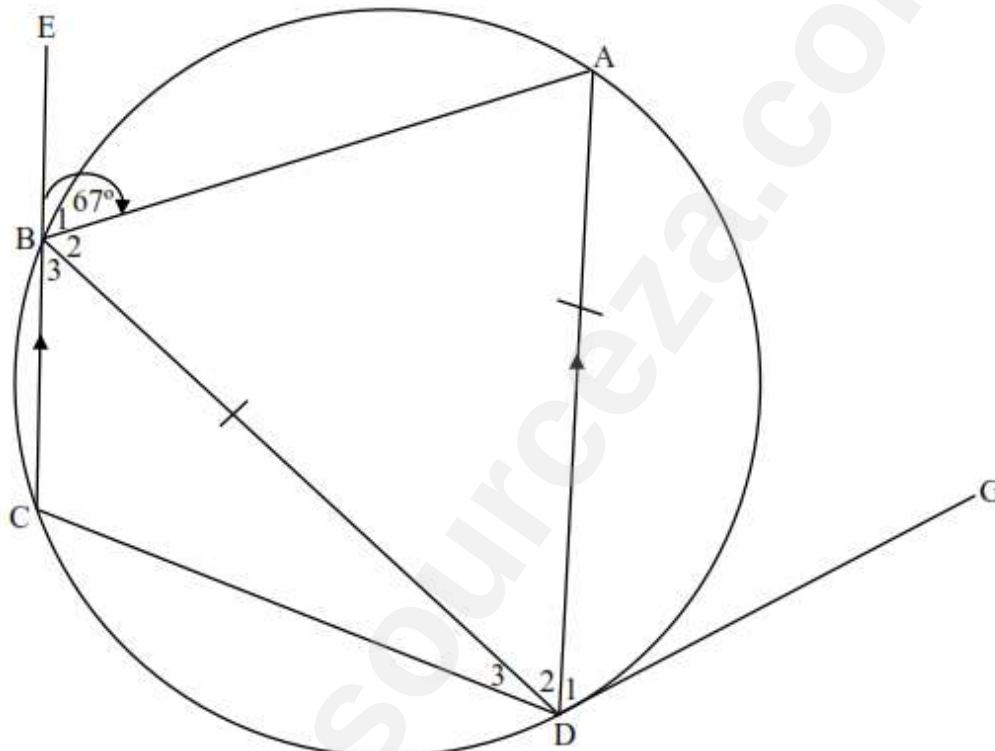
[20]

PREP 2020\_GAUTENG

QUESTION 8

In the diagram below, points A, B, C and D lie on the circumference of a circle with  $AD \parallel EC$ . CB is produced to E. GD is a tangent to the circle at D and  $DB = AD$ .

$\angle EBA = 67^\circ$ .



8.1 Calculate, with reasons, the size of the following angles:

8.1.1  $\angle ADC$  (2)

8.1.2  $\angle C$  (1)

8.1.3  $\angle A$  (1)

8.1.4  $\angle D_2$  (3)

8.1.5  $\angle BDG$  (2)

8.2 Prove that  $AB = CD$ . (2)

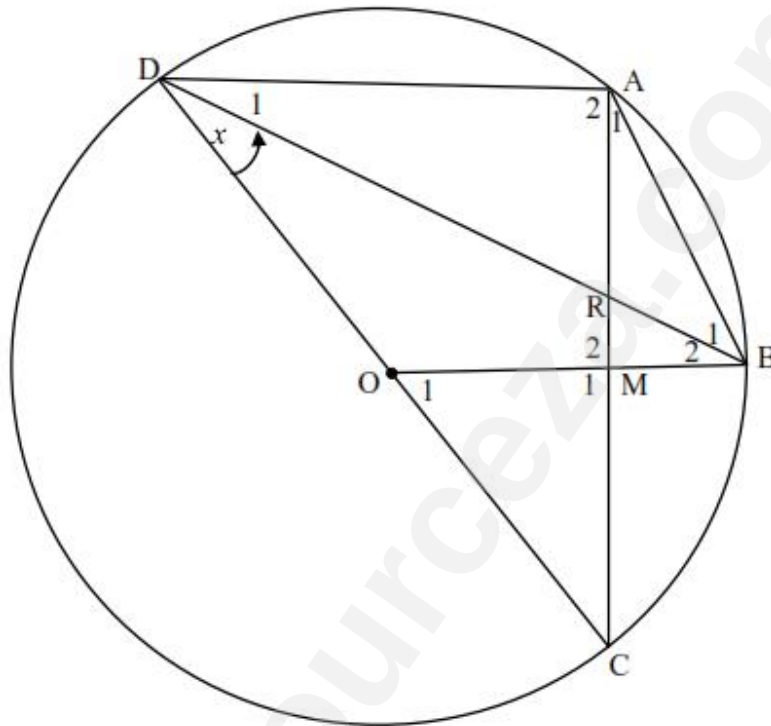
[11]

# GN (DI) STRATEGY FOR LEARNERS ATTAINMENT

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## QUESTION 9

- 9.1 In the diagram below, A, B, C and D are points on a circle with centre O. OB intersects AC at M, the midpoint of chord AC. Let  $\hat{BDC} = x$ .



9.1.1 Determine, with reasons, in terms of  $x$ :

(a)  $\hat{O}_1$  (1)

(b)  $\hat{ABO}$  (4)

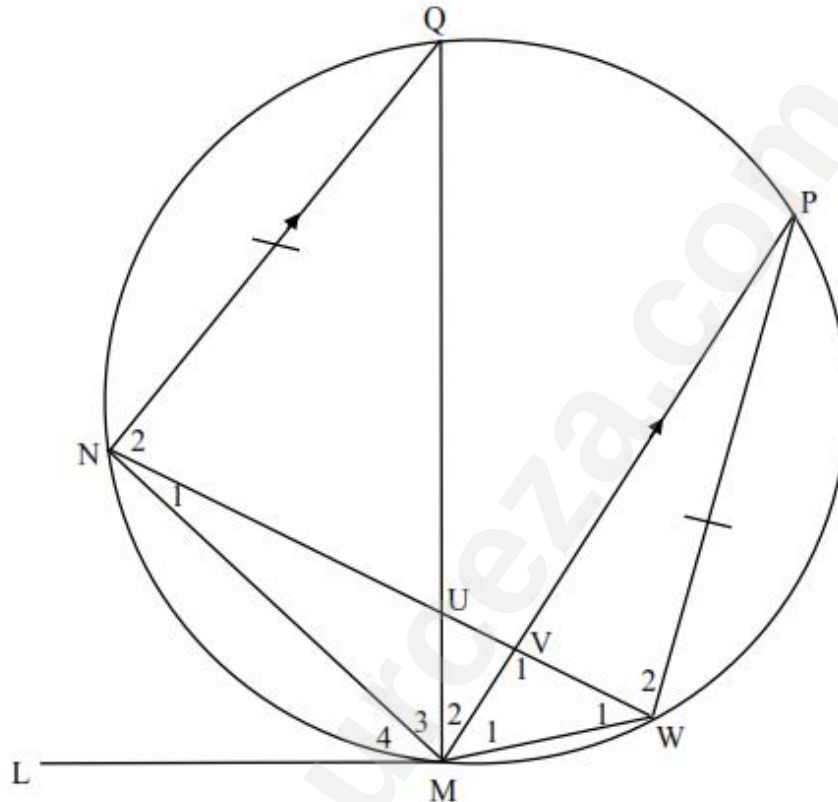
9.1.2 Prove that AB is a tangent to the circle that passes through points A, D and R. (6)

9.1.3 Prove that  $AD^2 = 4DO^2 - 4AB^2 + 4MB^2$ . (4)

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# GN (DI) STRATEGY FOR LEARNERS ATTAINMENT

- 9.2 In the diagram below, LM is a tangent to circle QNMWP at M. NW cuts QM and PM at U and V respectively. NQ = WP and NQ  $\parallel$  MP.

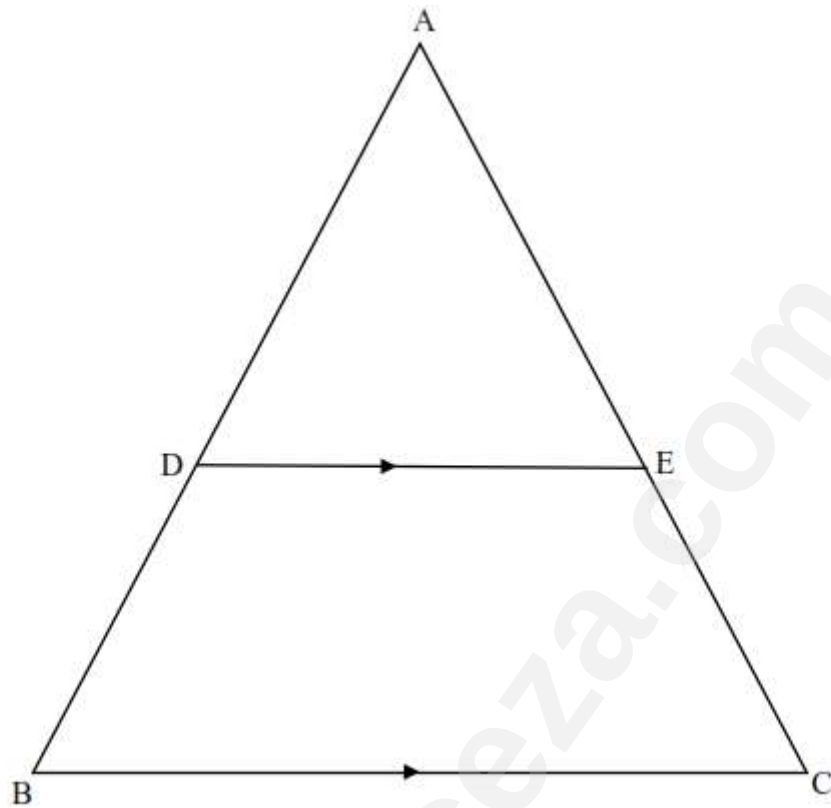


- 9.2.1 State, with reasons, THREE angles equal to  $\hat{M}_2$ . (3)
- 9.2.2 Prove that  $\triangle WMV \parallel \triangle QMN$ . (3)
- 9.2.3 Prove that  $\frac{MV}{WV} = \frac{MN}{PW}$ . (3)

[24]

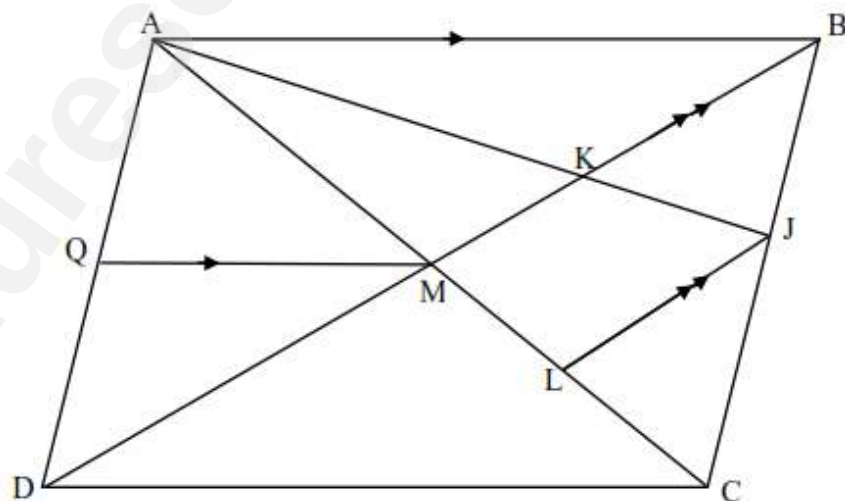
## QUESTION 10

- 10.1 In  $\triangle ABC$  below, D and E are points on sides AB and AC respectively such that  $DE \parallel BC$ .  
Prove the theorem which states that  $\frac{AD}{DB} = \frac{AE}{EC}$ .



(6)

- 10.2 ABCD is a parallelogram with diagonals that intersect at M. J is a point on BC. BJ : JC is 2 : 3. AJ meets BD at K.  $BD \parallel JL$  and JL meets AC at L. Q is a point on AD such that  $AB \parallel QM$ .



- 10.2.1 Determine, with reasons, the following ratios:

(a)  $\frac{ML}{LC}$

(2)

## GN (DI) STRATEGY FOR LEARNERS ATTAINMENT

$$(b) \quad \frac{AK}{KJ} \quad (3)$$

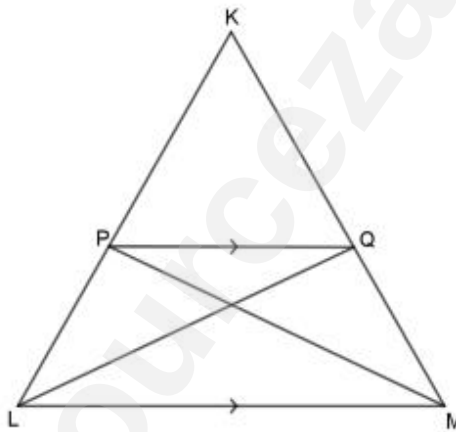
- 10.2.2 If  $AB = \sqrt{10}$  units and  $BC = \frac{2}{3}AB$ .  
Calculate the length of AQ. (4)

[15]

## PREP 2020\_KZN

## QUESTION 8

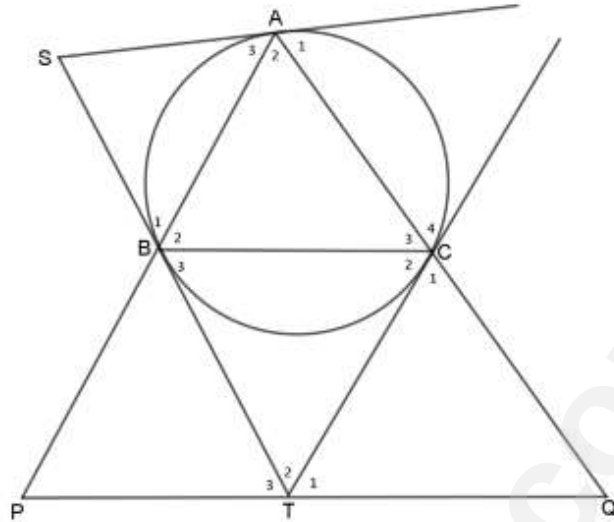
- 8.1 In the diagram below  $\triangle KLM$  is given, with P and Q lying on KL and KM respectively such that  $PQ \parallel LM$ . PM and LQ are drawn.



Prove that  $\frac{KP}{PL} = \frac{KQ}{QM}$  (6)

- 8.2 In the diagram, SBT, SA and TC are tangents to the circle at B, A and C respectively. AB is produced to P and AC is produced to Q such that T lies on the line PQ.

In  $\triangle APQ$ ,  $\frac{AB}{AP} = \frac{AC}{AQ}$ .

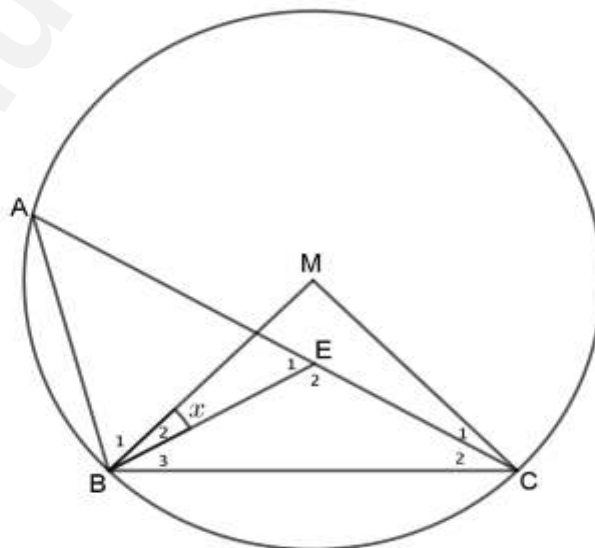


Use the above information to prove:

- 8.2.1  $\hat{A}_2 = \hat{T}_1$  (4)
  - 8.2.2  $\triangle ABC \parallel \triangle TCQ$  (4)
  - 8.2.3  $ABTQ$  is a cyclic quadrilateral. (4)
  - 8.2.4 Prove that  $TQ$  is a tangent to circle  $TBC$  at  $T$ . (5)
- [23]**

## QUESTION 9

In the diagram,  $M$  is the centre of the circle through  $A$ ,  $B$  and  $C$ .  $E$  is on  $AC$ .  $AC$  bisects  $\hat{MCB}$  and  $EB$  bisects  $\hat{MBC}$ .  $\hat{B}_2 = x$



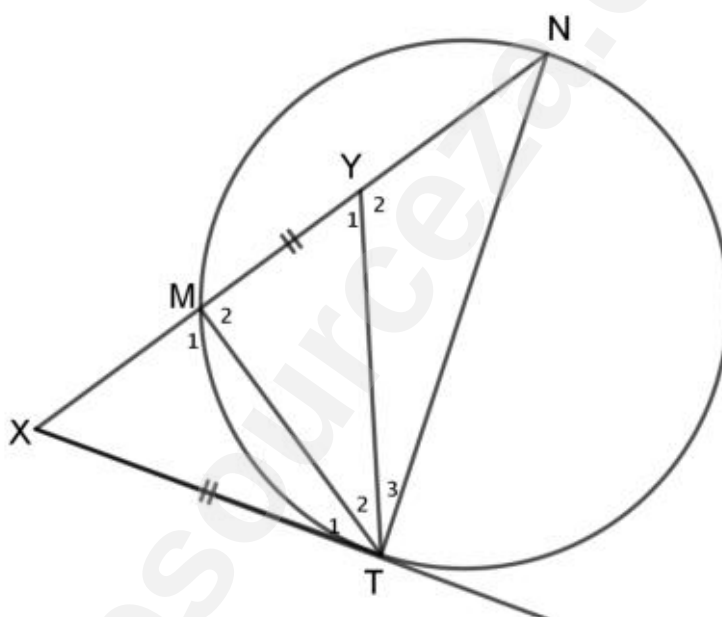
# GN (DI) STRATEGY FOR LEARNERS ATTAINMENT

- 9.1 Determine the size of  $\hat{E}_2$  in terms of  $x$ . (4)
- 9.2 Show  $\hat{BAC} = 90^\circ - 2x$  (3)
- 9.3 Prove that AE is a diameter of circle ABE. (5)

[12]

## QUESTION 10

- 10.1 In the diagram XMN is a straight line and XT is a tangent to the circle. Y is a point on XN so that  $XY = XT$ .



Prove that:

- 10.1.1 YT bisect  $\hat{MTN}$ . (5)

- 10.1.2  $\frac{XM}{XT} = \frac{XT}{XN}$  (6)

- 10.2 Given that  $MY = 20$  mm,  $YN = 50$  mm and  $XT = k$  mm:

- 10.2.1 Express XM in terms of  $k$ . (3)

- 10.2.2 Calculate the length of  $k$ . (4)

[18]