Province of the
EASTERN CAPE
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo
Provinsie van die Oos Kaap: Department van Onderwys
Porafensie Ya Kapa Botjahabela: Lefapha la Thuto

NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2026

MATHEMATICS P2

MARKS: **150**

TIME: **3 hours**

This question paper consists of 13 pages, including 1 information sheet and an answer book of 22 pages.

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

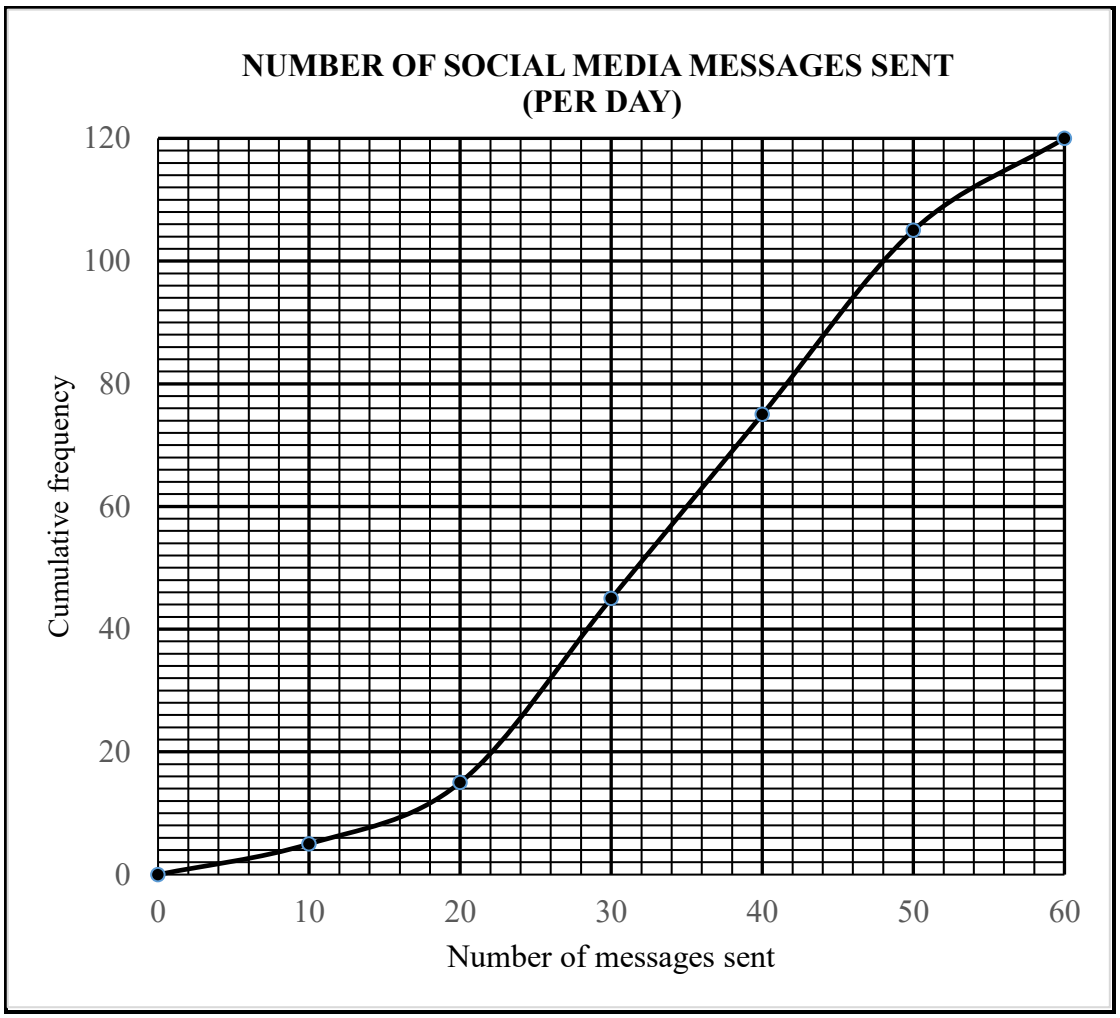
1. This question paper consists of 11 questions.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining the answers.
4. Answers only will NOT necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round off answers to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. An information sheet with formulae is included at the end of the question paper.
9. Write neatly and legibly.

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QUESTION 1

The ogive (cumulative frequency curve) below shows the number of social media messages sent by 120 learners in one day.



Use the ogive to answer the following questions.

1.1 How many learners sent less than 50 messages? (2)

1.2 Estimate the median number of messages sent per day. (2)

1.3 Determine the interquartile range (IQR) for the data. (3)

1.4 Draw a box and whisker diagram for the data on the numberline provided in the ANSWERBOOK, if minimum is 0 and maximum is 60. (2)

1.5 The mean number of messages is approximately equal to 37. Comment on the distribution of data. (2)

[11]

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QUESTION 2

From a school sports team, eight young athletes were chosen. The table below shows their weekly weightlifting hours and the distance (in meters) they could throw a javelin.

Learner	1	2	3	4	5	6	7	8
Number of hours (x)	5	12	15	20	25	30	42	45
Javelin distance (y)	130	118	115	95	88	72	48	30

2.1 Calculate the standard deviation of the javelin distances. (2)

2.2 Calculate the correlation coefficient (r) of the data. (1)

2.3 Determine the equation of the least squares regression line. (3)

2.4 A learner that was not chosen spent 35 hours per week in weightlifting.

2.4.1 Use your regression equation to predict the javelin distance he can cover. (2)

2.4.2 Is increasing gym hours likely to improve javelin distance? Justify your answer. (2)

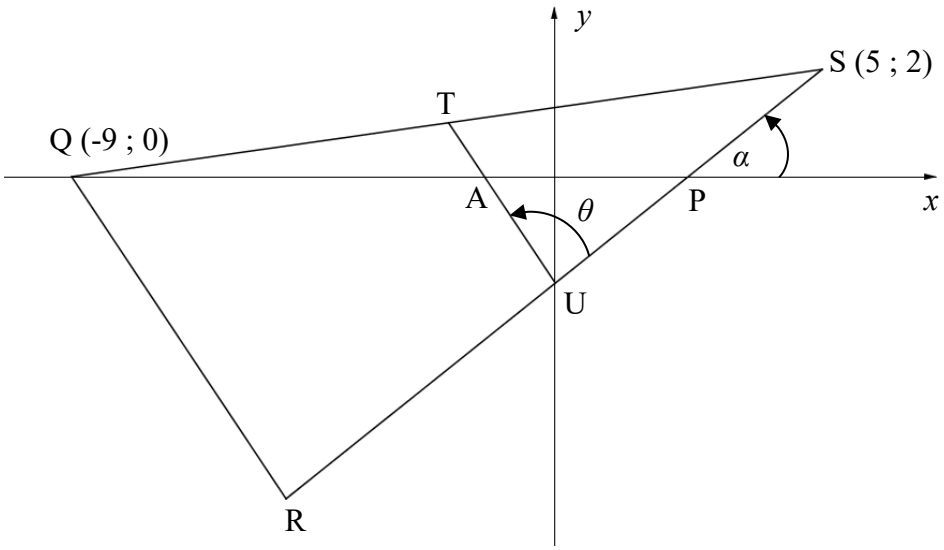
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QUESTION 3

In the diagram below, S (5 ; 2), Q (-9 ; 0) and R are vertices of Δ SQR. Point T is the midpoint of QS. Equation of SR is given by $5y = 4x - 10$. U is the y-intercept of TAU and SPUR. A and P lie on the x-axis. $T\hat{U}S = \theta$. Inclination of SPUR is α.



3.1 Calculate the coordinates of T, the midpoint of QS. (2)

3.2 Calculate the coordinates of U. (2)

3.3 Calculate length of SU. (2)

3.4 If it is further given that $3x + 2y + 27 = 0$ is the equation of QR, show that QR || TU. (3)

3.5 Hence or otherwise, write down the length of QR. (2)

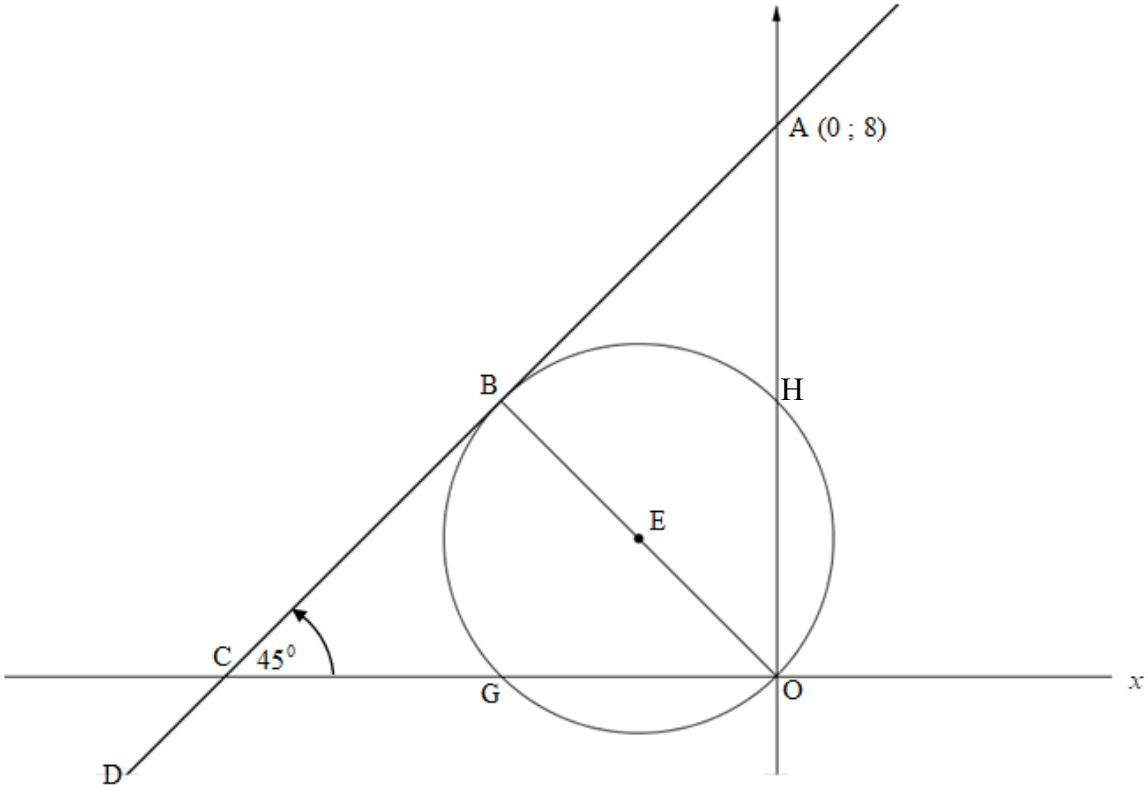
3.6 Determine the size of θ. (4)

3.7 Determine the area of Δ SQR. (4)
[19]

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QUESTION 4

A circle with centre E passes through the origin. The circle intersects the *x*-axis at G and the *y*-axis at H. The tangent to the circle at B cuts the *y*-axis at A (0 ; 8) and form an angle of 45° with the *x*-axis.



4.1 Write down the gradient of AD. (1)

4.2 Determine the equation of OB. (3)

4.3 Determine the coordinates of B, if the equation of the tangent is given by: $y = x+8$. (3)

4.4 Calculate the length of the radius of the circle. (3)

4.5 Determine the equation of the circle in the form $(x-a)^2+(y-b)^2=r^2$. (4)

4.6 For which values of t will the equation $y = x+t$ be a tangent to the circle? (2)

4.7 Another circle with equation $(x-4)^2+(y-8)^2=9$ is given. Determine whether the TWO circles touch each other or not. Justify your answer. (4)

[20]

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QUESTION 5

5.1 Given: sin 49° = q, determine the following in terms of q:

5.1.1 tan 41° (2)

5.1.2 cos 229° (2)

5.1.3 sin 4° (4)

5.2 Given: $f(x) = \dfrac{\sin(x-180^\circ).\sin(90^\circ + x)}{\sin^2 x - \cos^2(360^\circ - x)}$

5.2.1 Simplify $f(x)$ to a one trigonometric ratio of x. (7)

5.2.2 For which values of $x \in [-180^\circ + 0^\circ]$, is $f(x)$ undefined? (2)

[17]

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QUESTION 6

6.1 Given: $\cos(A-B)=\cos A\cos B+\sin A\sin B$

Use the formula given above to derive a formula for $\cos(A+B)$ (3)

6.2 **Without using a calculator**, prove that

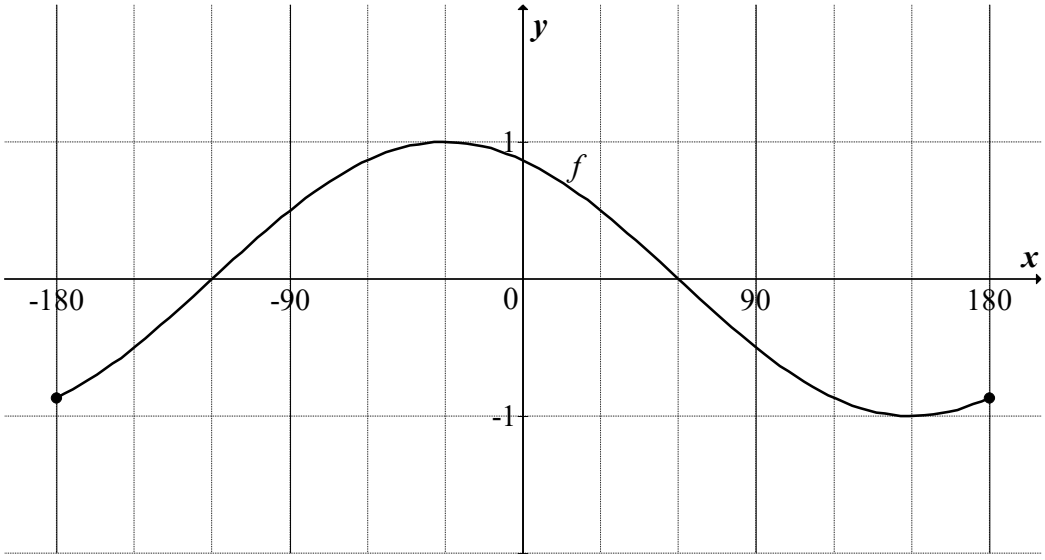
$$\frac{\sin 22^\circ.\cos 320^\circ+\sin 40^\circ\sin 68^\circ}{\sin 391^\circ.\cos 31^\circ}=2$$ (6)

6.3 It is given that $\cos 2x+5\sin x=3$. Determine the values of x in the interval where $-360^0\le x\le 0^0$ (5)

[14]

QUESTION 7

Given: $f(x)=a\cos(x+p)$ where $x\in[-180^0;180^0]$



7.1 Determine the values of a and p. (2)

7.2 Write down the period of f (1)

7.3 Sketch the graph of $g(x)=-\sin x$, where $x\in[-180^0;180^0]$ on the grid provided in the ANSWER BOOK. Clearly indicate intercepts with the axes. (3)

7.4 Write down the values of x where $g(x)=f(x)$ in the interval $x\in[-180^0;180^0]$. (2)

7.5 Determine the range of h, if $h(x)=-g(x)-2$. (2)

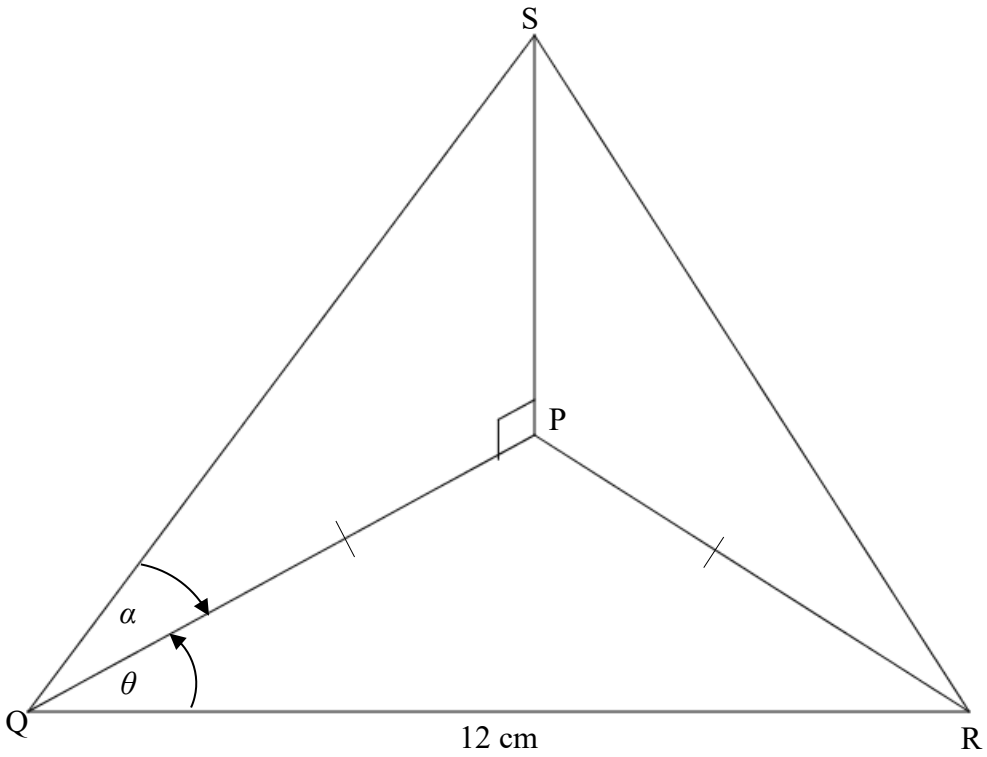
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QUESTION 8

In the diagram, Q, P and R are points on the same horizontal plane. S is the top of a vertical tower. $QR = 12\text{cm}$, $S\hat{Q}P = \alpha$ and $P\hat{Q}R = \theta$. PQ = PR



8.1 Show that $SQ = \dfrac{6}{\cos\theta\cos\alpha}$ (6)

8.2 If it is further given that $\theta = 50^\circ$ and $\alpha = 35^\circ$, calculate the length of SQ. **[Round off your answer to 2 decimal places.]** (2)
[8]

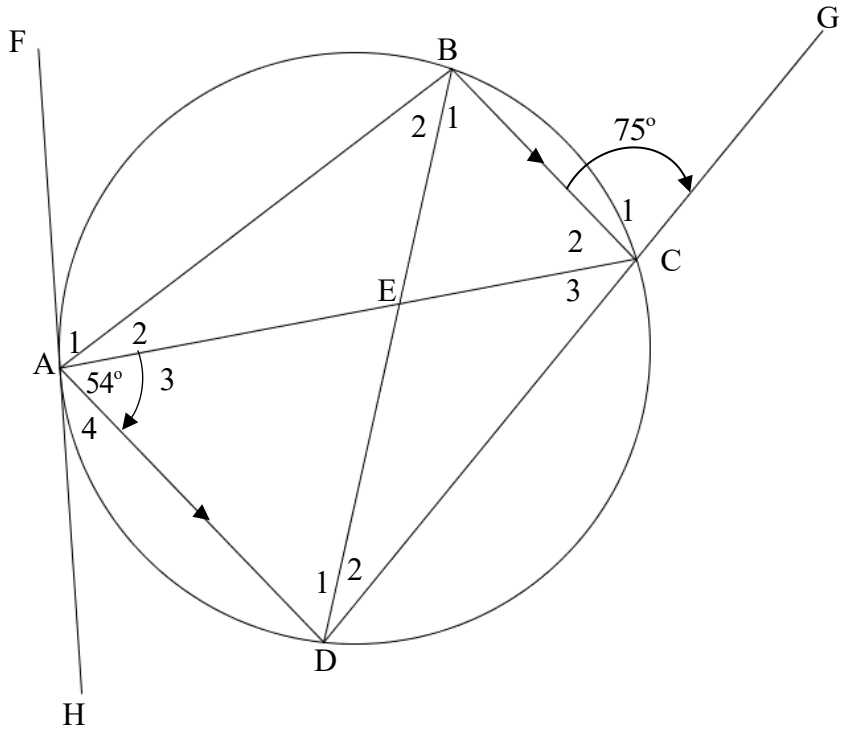
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QUESTION 9

9.1 Complete the theorem below:

Exterior angle of a cyclic quadrilateral … (1)

9.2 In the diagram below, ABCD is a cyclic quadrilateral. DC is extended to G. FAH is a tangent to the circle at point A. BC || AD, $\hat{C}_1 = 75^\circ$ and $\hat{A}_3 = 54^\circ$.



Determine the size of the following angles with reasons:

9.2.1 $\hat{A}_2$ (2)

9.2.2 $\hat{D}_2$ (2)

9.2.3 $\hat{A}_1$ (3)

9.2.4 Give a reason why AE = ED. (3)

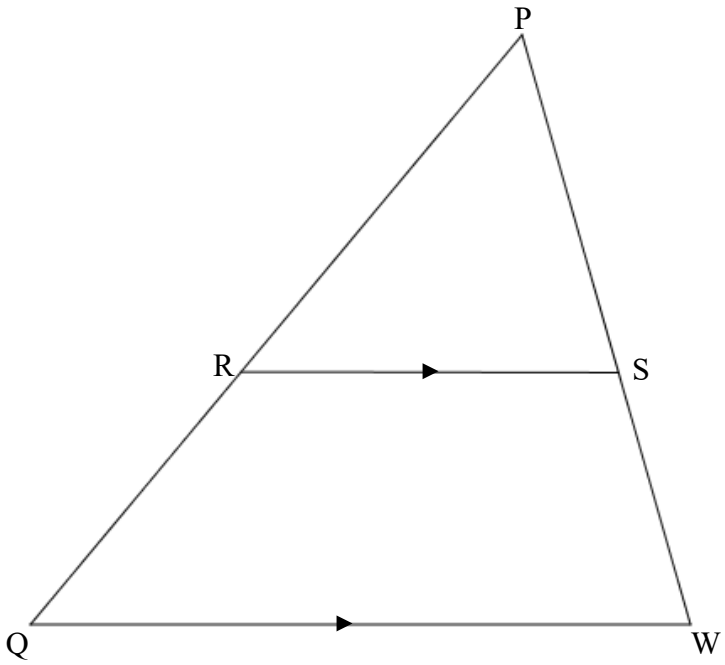
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QUESTION 10

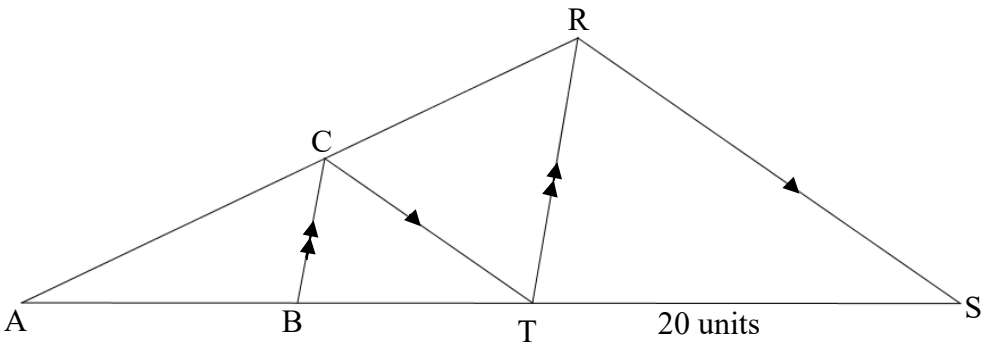
10.1 In the diagram below, ΔPQW is drawn with R on side PQ and S on side PW. RS is joined such that RS || QW. Prove the theorem which states that a line drawn parallel to one side of a triangle divides the other two sides proportionally,

i.e. prove that: $\frac{PR}{RQ} = \frac{PS}{SW}$



(5)

10.2 In the diagram below, ΔARS is drawn with C on line AR and B and T on line AS. BC || TR and CT || RS. TS = 20 units and AC : AR = 3 : 8.



Calculate the length of:

10.2.1 AT (4)

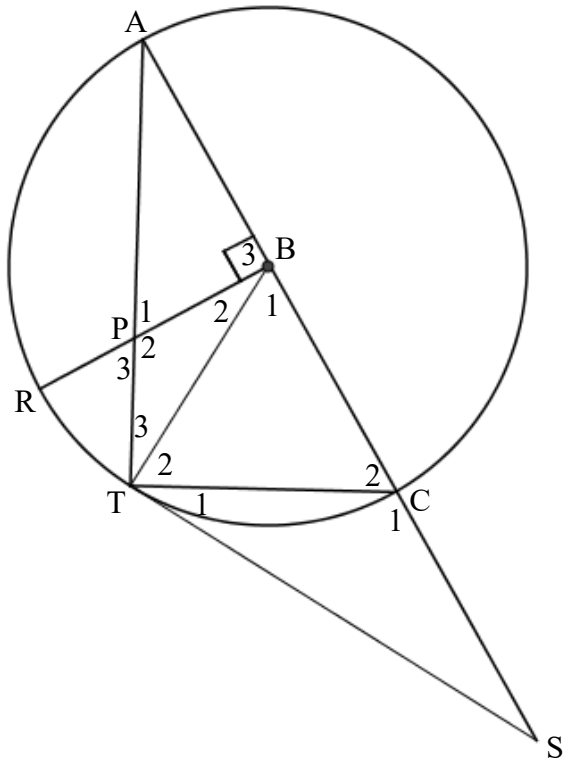
10.2.2 AB (3)

[12]

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QUESTION 11

In the diagram below, A, R, T and C are points on the circumference of the circle. B is centre of the circle. ABC the diameter of the circle is produced to S. TS is the tangent of the circle at T. BPR is perpendicular to ABC.



11.1 Name TWO other angles each equal to $\hat{T}_1$, giving reasons. (3)

11.2 Prove that PBCT is a cyclic quadrilateral. (3)

11.3 Prove that $\Delta SCT \,|||\, \Delta BPT$ (4)

11.4 Prove that $SC = \dfrac{ST.BP}{AB}$ (2)

11.5 Give a reason why $B\hat{T}S = 90^0$ (1)

11.6 If it is further given that $BR = CS$, prove that $TS = 3BP$. (5)

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TOTAL: 150

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INFORMATION SHEET: MATHEMATICS

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1+ni) \qquad A = P(1-ni) \qquad A = P(1-i)^n \qquad A = P(1+i)^n$$

$$F = \frac{x\left[(1+i)^n - 1\right]}{i} \qquad P = \frac{x\left[1-(1+i)^{-n}\right]}{i}$$

$$T_n = a + (n-1)d \qquad S_n = \frac{n}{2}\left(2a + (n-1)d\right)$$

$$T_n = ar^{n-1} \qquad S_n = \frac{a\left(r^n - 1\right)}{r-1} \; ; \quad r \neq 1 \qquad S_\infty = \frac{a}{1-r} \; ; \; -1 < r < 1$$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad \mathrm{M}\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \qquad y - y_1 = m(x - x_1) \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \tan\theta$$

$$(x-a)^2 + (y-b)^2 = r^2$$

$$In\ \Delta ABC: \ \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \qquad a^2 = b^2 + c^2 - 2bc.\cos A \qquad area\ \Delta ABC = \frac{1}{2}ab.\sin C$$

$$\sin(\alpha + \beta) = \sin\alpha.\cos\beta + \cos\alpha.\sin\beta \qquad \sin(\alpha - \beta) = \sin\alpha.\cos\beta - \cos\alpha.\sin\beta$$

$$\cos(\alpha + \beta) = \cos\alpha.\cos\beta - \sin\alpha.\sin\beta \qquad \cos(\alpha - \beta) = \cos\alpha.\cos\beta + \sin\alpha.\sin\beta$$

$$\cos 2\alpha = \begin{cases} \cos^2\alpha - \sin^2\alpha \\ 1 - 2\sin^2\alpha \\ 2\cos^2\alpha - 1 \end{cases} \qquad \sin 2\alpha = 2\sin\alpha.\cos\alpha$$

$$\bar{x} = \frac{\sum x}{n} \qquad \sigma^2 = \frac{\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^2}{n} \qquad P(A) = \frac{n(A)}{n(S)} \qquad P(A\ or\ B) = P(A) + P(B) - P(A\ and\ B)$$

$$\hat{y} = a + bx \qquad b = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sum(x - \bar{x})^2}$$

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