SECTION A
[40 marks]

Answer **all** *the questions in this section.* **All** *questions carry* **equal** *marks.*

1. The first term of an Arithmetic Progression is –23 and the ratio of the 11^{th} term to the 18^{th} term is 1 : 4. Calculate the:

   (*a*) common difference;

   (*b*) sum of the first 21 terms of the progression.

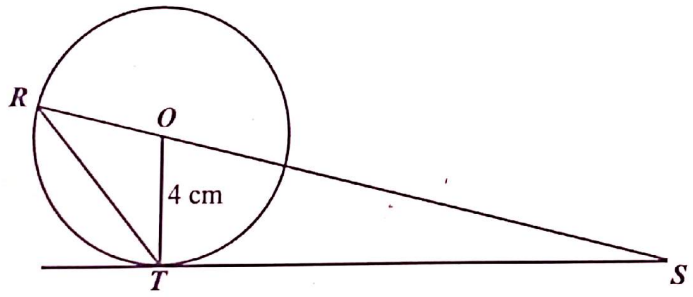
2. An office messenger on an errand covered 14 km using a bicycle. The average speed of the bicycle was increased by 1 unit after covering the first 6 km. If the journey was completed in 4 hours, deduce the speed for the remaining journey.

3. A lighthouse is 60 m high. A ship initially observes the top of the lighthouse at an angle of elevation of $5°$. After sailing closer, it stopped and the angle of elevation from that point was $15°$.

   (*a*) Illustrate the information in a diagram.

   (*b*) Determine the initial horizontal distance of the ship from the lighthouse.

   (*c*) Find the new horizontal distance when the ship stopped.

4. 

NOT DRAWN TO SCALE

In the diagram, O is the centre of the circle. $\overline{TS}$ is a tangent to the circle at T. $|OT| = 4$ cm and $|RS| = 14$ cm. Find $+OTR$.

5. A box contains 4 green, 10 red and x number of black pens, all of same kind **except** colour. The probability of selecting at random, 2 black pens, one after the other **without** replacement is $\frac{1}{10}$. Find the number of black pens in the box.

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SECTION B

[60 marks]

Answer **five** *questions* **only** *from this section.* **All** *questions carry* **equal** *marks.*

6. (*a*) Given that $\sin x = \frac{8}{17}$, $0° < x < 90°$, without using calculator, find the value of:

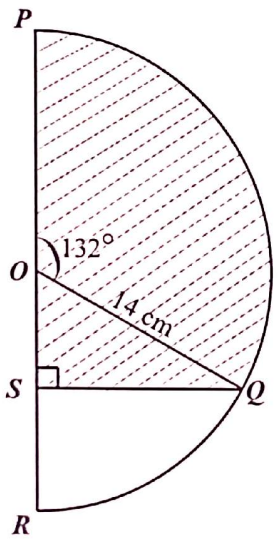
$$\frac{2 \tan x - 3 \cos x}{\sin x}.$$

(*b*) Solve: $\frac{3}{5}(x+2) \# -\frac{1}{4}(2x-7)$.

7. (*a*) Two hired car drivers Adu and Badu take their clients in **each** of their vehicles on a journey of **equal** distances. Adu drives at 80 km/h and spent $2\frac{1}{2}$ h for the journey while Badu drives at an average speed of 75 km/h. What is the difference between their arrival times?

(*b*) Given that $\cos(19 + \frac{3m}{2})° = \sin 29°$, where m is an acute angle, find the value of m.

8.



NOT DRAWN TO SCALE

In the diagram, P, Q, R and S are points on a semi-circle with centre O and radius 14 cm. $\overline{QS}$ is perpendicular to $\overline{PR}$ at S and $+POQ = 132°$. Find the:

(*a*) perimeter of the shaded portion;

(*b*) area of the shaded portion.
[Take $\pi = \frac{22}{7}$]

9. A field has the shape of an equilateral triangle of side 6 m. A horse is tired to one of its vertices with a rope of length 4.2 m.

(*a*) Illustrate the information in a diagram.

(*b*) Calculate, correct to the **nearest** percentage, the area that can be grazed by the horse on the field.

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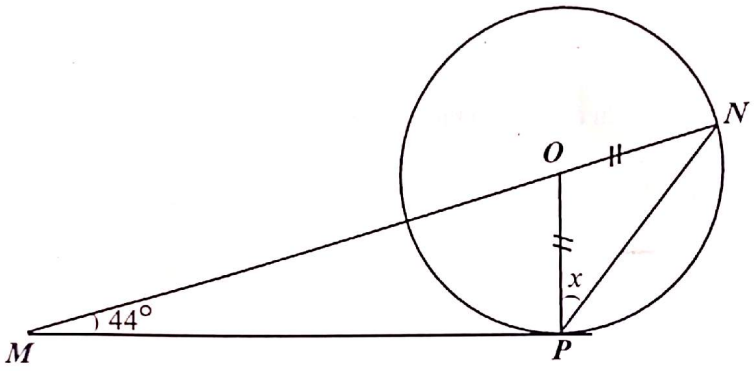
10. Two numbers, x and y are in the ratio 4 : 9 respectively. When 6 is added to **each** of the numbers, the ratio becomes 7 : 12. If 7 is added to **each** of the original numbers, find the new ratio.

11. Two birds X and Y on the ground and on the same side of a tree (T) observes the top of the tree at an angle of elevation of 45° and 60° respectively. If the distance between X and Y is 6 m:

(*a*) illustrate the information in a diagram;

(*b*) calculate, correct to **four** significant figures, the height of the tree.

12. (*a*)



NOT DRAWN TO SCALE

In the diagram M and P are points on the circle centre O. $\overline{MP}$ is a tangent to the circle at P, MON is a straight line and $\angle NMP = 44^\circ$. Find the size of the angle marked x.

(*b*) Two conference halls M and N are to be filled with people. M accommodates 150 people **more** than N. If 70 seats were empty in **each** of the halls and at that time the ratio of the people in M and N is 38 : 23, find the capacity of M and N.

13.

Marks	1	2	3	4	5
Frequency	$x^2 + 2$	1	$x^2 + 1$	3	$x + 3$

The table shows the marks distribution of a class in a test. If the mean score is 3, find the:

(*a*) value of x;

(*b*) total number of students who took the test;

(c) standard deviation.

END OF PAPER

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