*Time Allowed*: 3 hours] [*Maximum Marks*: 80

***General Instructions:***

1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 01 mark each.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

## SECTION – A

**Section A consists of 20 questions of 1 mark each.**

**1.** If one of the zero of the polynomial $p(x) = x^2 - kx - 3$ is 3, then the value of $k$ is

(*a*) $-3$ (*b*) 2 (*c*) $-2$ (*d*) 0

**2.** The HCF of the smallest 2-digit composite number and 2-digit largest prime number is

(*a*) 2 (*b*) 0 (*c*) 10 (*d*) 1

**3.** The solution of pair of linear equations $x + y = 7$ and $x - y = 1$ is

(*a*) $x = 6, y = 1$ (*b*) $x = 5, y = 2$ (*c*) $x = 5, y = 4$ (*d*) $x = 4, y = 3$

**4.** Which of them is not a similarity criterian for two triangles?

(*a*) SSS similarity criterion (*b*) AA similarity criterion

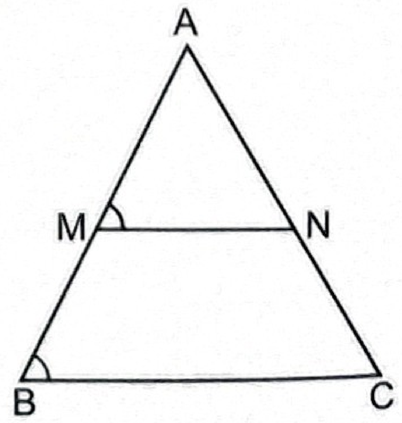
(*c*) SAS similarity criterion (*d*) SSA similarity criterion

**5.** For what value of $k$, the quadratic equation $9x^2 + 3kx + 4 = 0$ has real and equal roots?

(*a*) $\pm 3$ (*b*) $\pm 6$

(*c*) $\pm 4$ (*d*) 0

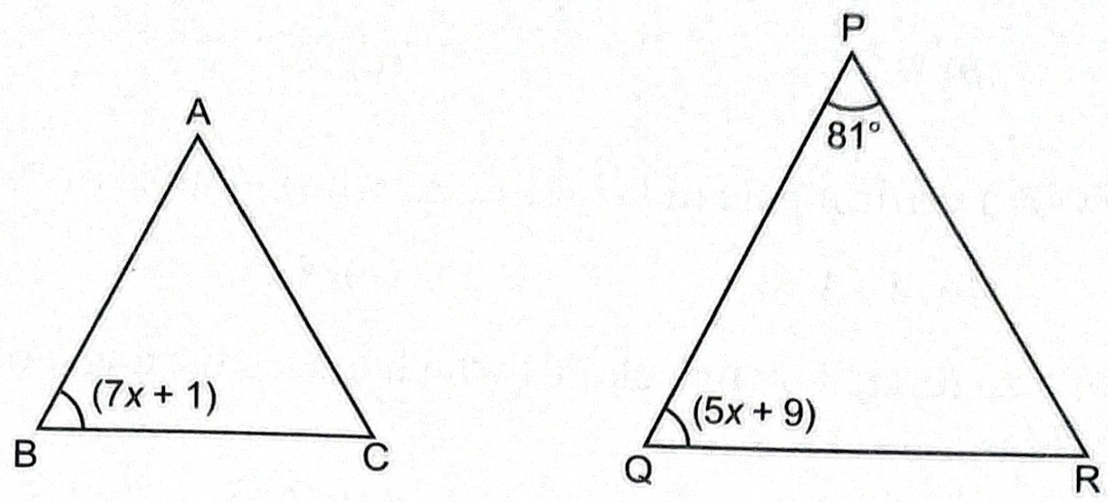
**6.** In the given figure, $\angle AMN = \angle ABC$, if AB = 8 cm, AM = 3 cm, AC = 12 cm, then NC is equal to




(*a*) 9 cm (*b*) 4 cm

(*c*) 7.5 cm (*d*) 8.5 cm

7. In the given figure, if $\Delta ABC \sim \Delta PQR$, then value of $\angle C$ is




(a) 70° (b) 50° (c) 29° (d) 81°

8. The ratio of CSA (curved surface area) to the total surface area of a cylinder having height equal to radius of its base is

(a) 2 : 1 (b) 1 : 1 (c) 1 : 2 (d) 2 : 3

9. If mean of given distribution is 6.1, then value of $x$ is

| $x_i$ | 1 | 3 | 5 | 7 | 9 |
|---|---|---|---|---|---|
| $f_i$ | $x+1$ | $x+4$ | $x+7$ | $x+8$ | $x+10$ |

(a) 4 (b) 2 (c) 10 (d) 0

10. For some data, mean: mode = 5:3, then median: mode is

(a) 13 : 1 (b) 8 : 3 (c) 5 : 3 (d) 13 : 9

11. A basket contains 7 apples and some oranges. If the probability of drawing an apple is $\frac{1}{3}$rd of an orange, then number of oranges in the basket is

(a) 7 (b) 21 (c) 10 (d) 14

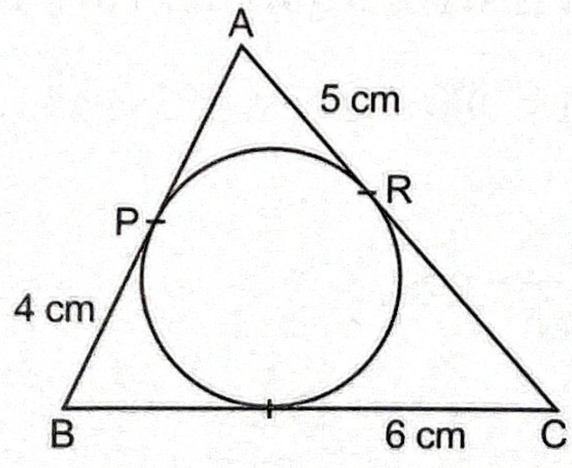
12. The volume of metal used for making a pipe of length 14 cm, having outer and inner radii as 2.2 cm and 1.8 cm is

(a) 140.8 $cm^3$ (b) 35.2 $cm^3$ (c) 17.6 $cm^3$ (d) 70.4 $cm^3$

13. If the length of tangent drawn from an external point is $\sqrt{3}$ times the radius of the circle, then angle between two tangents drawn from same point is

(a) 60° (b) 30° (c) 45° (d) 120°

14. In figure, the perimeter of $\Delta ABC$ is




(a) 15 cm (b) 30 cm (c) 32 cm (d) 120 cm

**15.** If $\sin\theta + \cos\theta = \sqrt{2}$, then value of $\sin\theta - \cos\theta$ is

(*a*) $\sqrt{2}$ (*b*) $\pm\frac{1}{\sqrt{2}}$ (*c*) 0 (*d*) $\pm\sqrt{2}$

**16.** The length of shadow of a vertical pole of height 12 m, when altitude of Sun is 30°, is

(*a*) $12\sqrt{3}$ m (*b*) $4\sqrt{3}$ m (*c*) 12 m (*d*) $6\sqrt{3}$ m

**17.** The ratio of length of arcs formed by two chords which makes the angle of 30° and 60° respectively with centre of the circle is

(*a*) 1 : 2 (*b*) 2 : 1 (*c*) 2 : 3 (*d*) 1 : 1

**18.** If point $C\left(\frac{q}{2}, 4\right)$ is the mid point of A($p$, 0) and B(0, $q$), then value of $\frac{p}{q} + \frac{q}{p}$ is

(*a*) 4 (*b*) 2 (*c*) 0 (*d*) 6

**Direction:** In the question number 19 and 20, a statement of **assertion (A)** is followed by a statement of **reason (R)**. Choose the correct option.

**19.** **Statement A (Assertion):** $(3 \times 3 \times 2 \times 2 + 7)$ is a composite number.

**Statement R (Reason):** A number having more than 2 factors is called a composite number.

(*a*) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(*b*) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A).

(*c*) Assertion (A) is true but reason (R) is false.

(*d*) Assertion (A) is false but reason (R) is true.

**20.** **Statement A (Assertion):** $y$-axis divides the line joining points A(–3, 5) and B(3, 1) at P(0, 3), where P is the mid point of line AB.

**Statement R (Reason):** The mid point of a line segment divides the line segment in the ratio of 1 : 1.

So, the coordinates of mid-point $p$ of line joining the points A $(x_1, y_1)$ and B$(x_2, y_2)$ is $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$.

(*a*) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(*b*) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A).

(*c*) Assertion (A) is true but reason (R) is false.

(*d*) Assertion (A) is false but reason (R) is true.

## SECTION – B

**Section B consists of 5 questions of 2 marks each.**

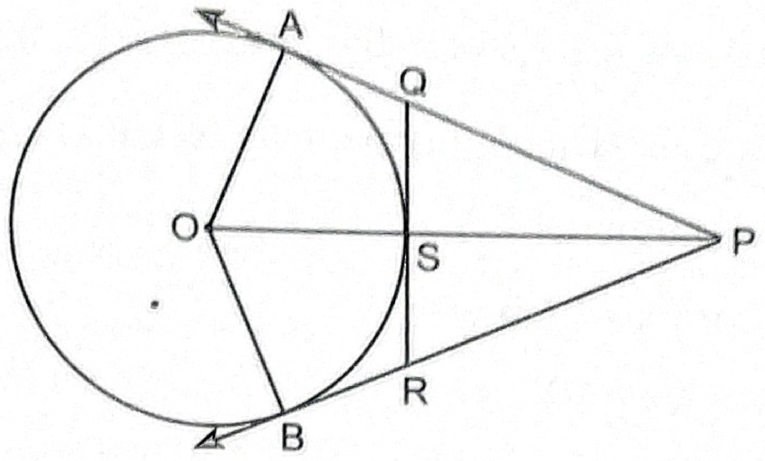
**21.** The cost of 2 chairs and 3 tables is ₹ 900 and cost of 5 chairs and 4 tables is ₹ 1550, find the cost of a chair and a table.

**22.** If $\sin\phi = \frac{3}{5}$, find the value of $\frac{1}{\tan\phi} + \cos\phi$.

**OR**

Show that: $\frac{\sin^3\theta}{\sin\theta + \cos\theta} + \frac{\cos^3\theta}{\sin\theta + \cos\theta} = \frac{\text{cosec}\,\theta\sec\theta - 1}{\text{cosec}\,\theta.\sec\theta}$

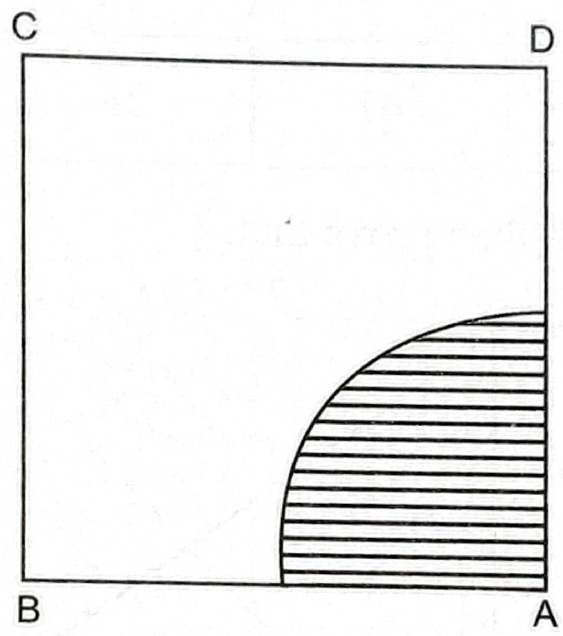
**23.** From an external point P, 25 cm away from the centre O of circle having radius 7 cm, two tangents PA and PB are drawn as shown in figure. Find the perimeter of triangle PQR.




**24.** A brooch is made with silver wire in the form of a circle with diameter 35 mm. The wire is also used in making 5 diameters which divide the circle into 10 equal sectors. Find the area of each sector of brooch.

**OR**

An arc having radius equal to half the side of a square of length 7 cm is drawn as shown in figure. Find the area of shaded region.




**25.** $\Delta ABC \sim \Delta PQR$, where AD and PM are the medians of the triangles respectively. Prove that

$$\frac{AB}{PQ} = \frac{AD}{PM}$$

## SECTION – C

**Section C consists of 6 questions of 3 marks each.**

**26.** Prove that $3 - 2\sqrt{5}$ is an irrational number.

**27.** If 3 and $\frac{5}{2}$ are the zeroes of polynomial $ax^2 - 11x + b$, then find the values of $a$ and $b$.

**28.** Prove that :

$$\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \text{cosec } A + \cot A, \text{ where A is an acute angle.}$$

**29.** Two shopkeeper's daily sales are in the ratio of 3 : 5 and daily expenditures are in ratio of 6 : 11. Both of them save ₹ 600 per day. Find the daily sales and expenditures of both shopkeepers.

**OR**

5 years ago, the sum of ages of two friends was 25 years. 5 years later, the difference between 6 times the age of first friend and 5 times the age of second friend is 6 years. Find the present age of both friends.

**30.** Prove that the parallelogram circumscribing a circle is a rhombus.

**OR**

Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

**31.** Two dice, a black and a red are thrown simultaneously. What is the probability of

(*i*) both dice showing even numbers?

(*ii*) any one dice getting a prime number?

(*iii*) both dice showing same results?

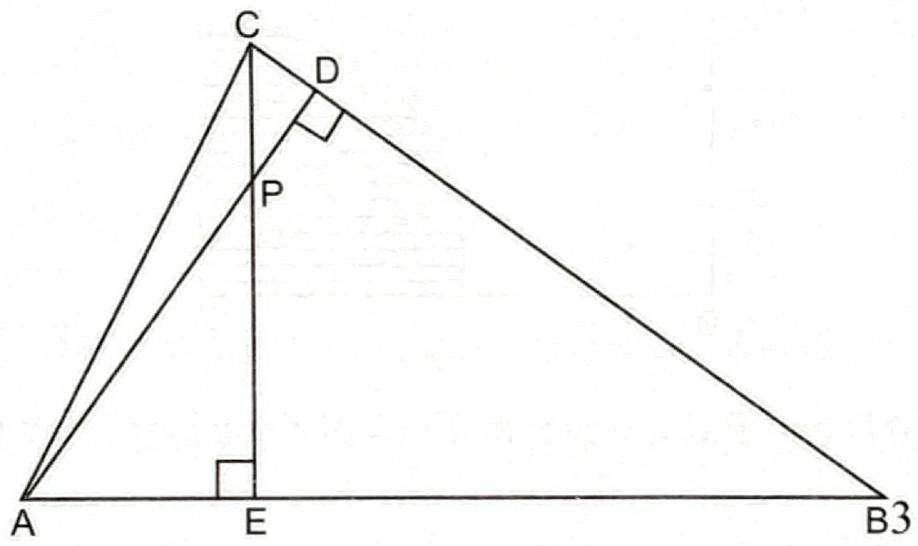
## SECTION – D

**Section D consists of 4 questions of 5 marks each.**

**32.** Find the mean of the data using appropriate method.

| **Class interval** | 100–150 | 150–200 | 200–250 | 250–300 | 300–350 | 350–400 |
|---|---|---|---|---|---|---|
| **Frequency** | 45 | 67 | 25 | 35 | 50 | 58 |

**33.** In figure AD ⊥ BC and CE ⊥ AB, then prove that:




(*i*) $\Delta AEP \sim \Delta CDP$ (*ii*) $\Delta ABD \sim \Delta CBE$ (*iii*) $\Delta AEP \sim \Delta ADB$ (*iv*) $\Delta PDC \sim \Delta BEC$

**34.** A metal article was made by scooping out a hemispherical depression from each end of a solid cylinder. If the radius of base of cylinder is 10.5 cm and its height is 30 cm, then find the cost of polishing the solid at the rate of ₹ 12 per $cm^2$.

**OR**

A toy is in the shape of a cylinder with hemispherical ends. If whole length of the toy is 20 cm and the radius of each of hemispherical ends is 3.5 cm, then find the volume of air contained in the toy.

**35.** A pole has to be erected at a point on the boundary of a circular park of diameter 13 metres in such a way that the differences of its distances from two diametrically opposite fixed gates A and B on the boundary is 7 metres. Is it possible to do so? If yes, at what distances from the two gates should the pole be erected?

**OR**

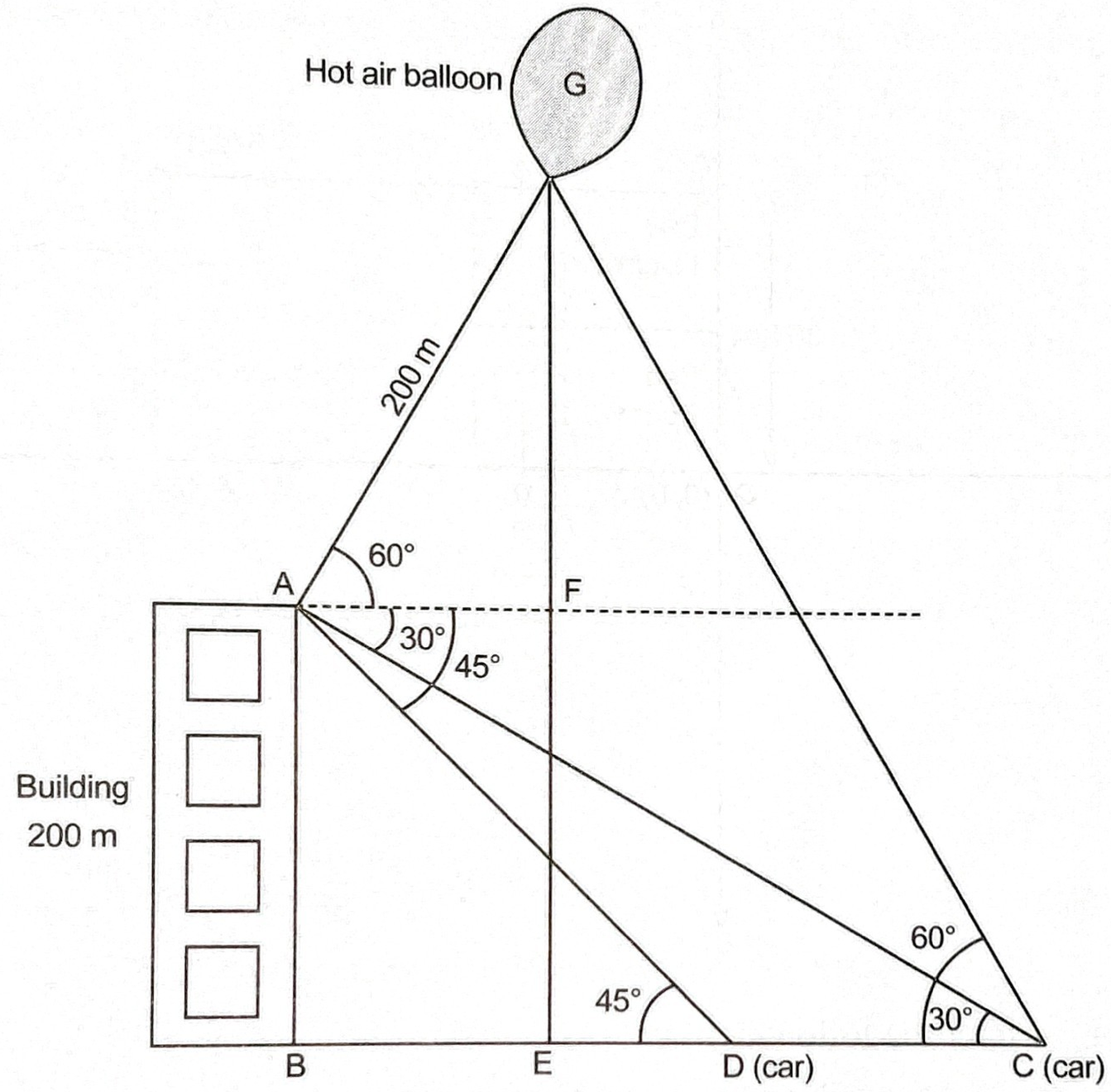
Solve the following quadratic equation by factorisation method.

$$\frac{1}{2a+b+x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{x},\ 2a+b \neq 0$$

## SECTION – E

**Case study based questions are compulsory.**

**36.** Ram is celebrating his birthday on terrace of a 200 m tall building. A hot air balloon with 'Happy Birthday' written on it is tied with edge of building with the help of a 200 m long rope. Because of wind, the balloon makes an angle of 60° with horizontal. Suddenly, his friend coming towards the building in his car with uniform speed observe that, the angle of elevation of balloon from the car is 60° and angle of depression of car from top of building is 30° at any instant. After sometime the angle of depression of the car from the top of the building changes to 45°.




Based on above, answer the following:

(*i*) Find distance of car (C) from foot of the building.

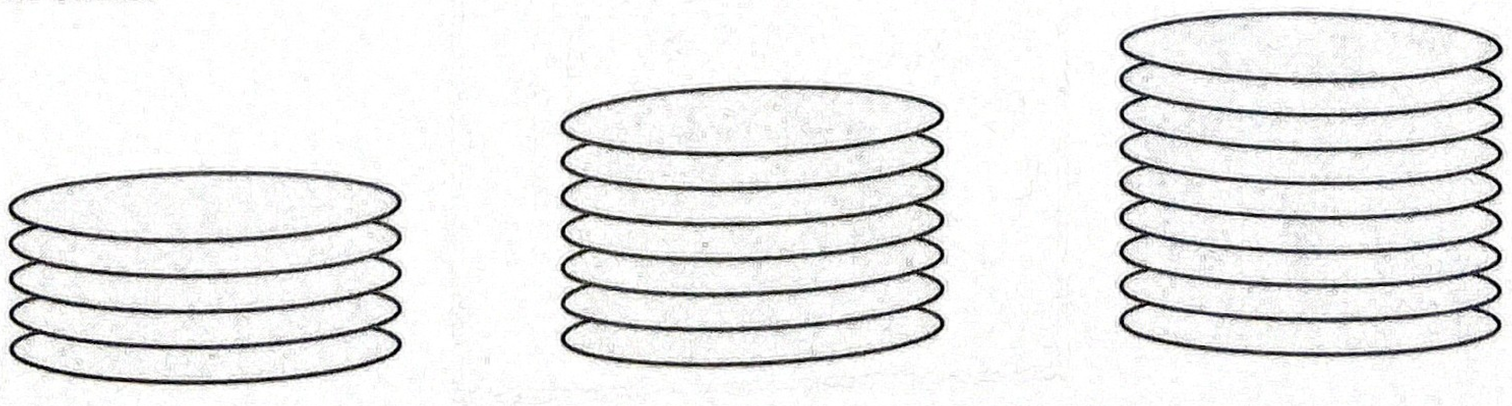
(*ii*) Find the distance travelled by car from point C to D.

(*iii*) Find the height of balloon from the ground.

OR

If car is approaching the foot of the building with a uniform speed of 8 m/s, then find time taken by the car to reach the foot of building from point D.

**37.** A child is playing with coins which he took out from his piggy bank. He made towers with the coins. The 1st tower contains 5 coins and he keeps on increasing 2 coins with each tower. The child is having 192 coins in total.



Based on above, answer the following:

(*i*) Find number of coins in 5th tower.

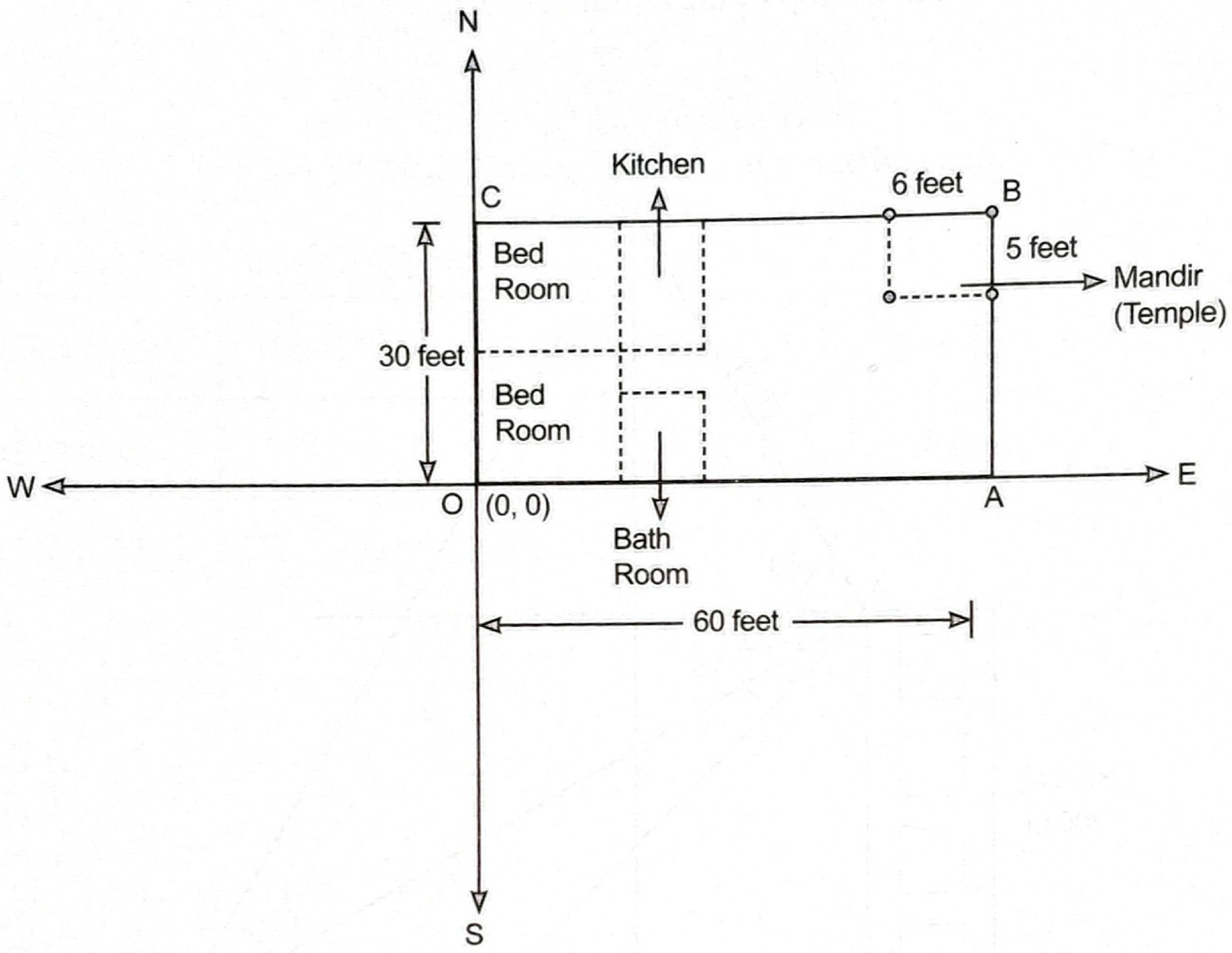
(*ii*) How many more coins are in 10th tower as compared to 5th tower?

(*iii*) Find the number of towers that can be made by using all coins.

**OR**

If each coin has a denomination of ₹ 5, find total money in 7th tower.

**38.** Ravi got a rectangular plot as a gift from his grandfather. The plot is East facing with dimension 60 feet towards East by 30 feet towards North as shown in figure.




Based on above, answer the following:

(*i*) Write the coordinates of his plot taking O as origin.

(*ii*) An Architect draws a map of Ravi's house. He designs a temple (Mandir) in North-East direction of the house with dimensions 5 feet × 6 feet. Find coordinates of temple.

(*iii*) Find the coordinates of point(P) lying on line OB which divides OB internally in the ratio 2 : 3.

**OR**

What is the ratio of shorter side : longer side : diagonal?