

Secondary School Certificate Examination

September 2021

Marking Scheme — Mathematics (Standard) 30/B

General Instructions:

1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2. "Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its' leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/ Website etc may invite action under IPC."
3. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and marks be awarded to them. In class-X, while evaluating two competency based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, marks should be awarded.
4. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
5. Evaluators will mark (✓) wherever answer is correct. For wrong answer 'X' be marked. Evaluators will not put right kind of mark while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing.
6. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
7. If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
8. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
9. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
10. A full scale of marks _____(example 0-100 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.

11. Every examiner has to necessarily do evaluation work for full working hours i.e. 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).
12. Ensure that you do not make the following common types of errors committed by the Examiner in the past:-
 - Leaving answer or part thereof unassessed in an answer book.
 - Giving more marks for an answer than assigned to it.
 - Wrong totaling of marks awarded on a reply.
 - Wrong transfer of marks from the inside pages of the answer book to the title page.
 - Wrong question wise totaling on the title page.
 - Wrong totaling of marks of the two columns on the title page.
 - Wrong grand total.
 - Marks in words and figures not tallying.
 - Wrong transfer of marks from the answer book to online award list.
 - Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)
 - Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
13. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0) Marks.
14. Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
15. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.
16. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.
17. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.

QUESTION PAPER CODE 30/B
EXPECTED ANSWER/VALUE POINTS

SECTION A

1. If 2 tables and 2 chairs cost Rs. 700 and 4 tables and 3 chairs cost Rs. 1,250, then find the cost of one table.

Ans. $2x + 2y = 700, 4x + 3y = 1250$, where x is number of tables & y is number of chairs. $\frac{1}{2}$

$x = \text{Rs. } 200$ $\frac{1}{2}$

2. If the graph of a pair of lines $x - 2y + 3 = 0$ and $2x - 4y = 5$ be drawn, then what type of lines are drawn?

Ans. $\frac{1}{2} = \frac{-2}{-4} \neq \frac{3}{-5}$ $\frac{1}{2}$

Parallel lines. $\frac{1}{2}$

3. If one zero of the polynomial $p(x) = (a^2 + 4)x^2 + 20x + 4a$ is reciprocal of the other, find the value of a .

Ans. $a^2 + 4 = 4a$ $\frac{1}{2}$

$\Rightarrow a = 2$ $\frac{1}{2}$

4. (a) After how many decimal places will the decimal expansion of the rational number $\frac{14587}{1250}$ terminate?

Ans. $1250 = 2 \times 5^4$ $\frac{1}{2}$

$\Rightarrow 4$ decimal places $\frac{1}{2}$

OR

- (b) State giving reason, whether $5 \times 7 \times 11 + 11$ is a composite number or a prime number.

Ans. $5 \times 7 \times 11 + 11 = 11 \times (35 + 1)$ $\frac{1}{2}$

It has factor except 1 and number itself, hence a composite number. $\frac{1}{2}$

5. (a) If the 6th and 14th terms of an A.P. are 29 and 69 respectively, then find the 10th term of the A.P.

$$\left. \begin{array}{l} \text{Ans. } a + 5d = 29 \\ a + 13d = 69 \end{array} \right\} \quad \frac{1}{2}$$

$$\Rightarrow a_{10} = 49 \quad \frac{1}{2}$$

OR

- (b) If the first three consecutive terms of an A.P. are $3y - 1$, $3y + 5$ and $5y + 1$, find the value of y .

$$\text{Ans. } 2(3y + 5) = 3y - 1 + 5y + 1 \quad \frac{1}{2}$$

$$y = 5 \quad \frac{1}{2}$$

6. Find the roots of the quadratic equation

$$x^2 + x - (a + 1)(a + 2) = 0.$$

$$\text{Ans. } x^2 + (a + 2)x - (a + 1)x - (a + 1)(a + 2) = 0 \quad \frac{1}{2}$$

$$x = -(a + 2), (a + 1) \quad \frac{1}{2}$$

7. (a) In a right triangle ABC, right-angled at B, $BC = 6$ cm and $AB = 8$ cm. A circle is inscribed in the ABC. Find the radius of the incircle.

$$\text{Ans. } AC = 10 \text{ cm} \quad \frac{1}{2}$$

$$r = 2 \text{ cm} \quad \frac{1}{2}$$

OR

- (b) Two circles touch externally at P and AB is a common tangent, touching one circle at A and the other at B. Find the measure of $\angle APB$.

$$\text{Ans. } \angle APB = 90^\circ \quad 1$$

8. Solve for x :

$$10x - \frac{1}{x} = 3, x \neq 0$$

Ans. $10x^2 - 3x - 1 = 0$

$$\frac{1}{2}$$

$$x = \frac{-1}{5}, \frac{1}{2}$$

$$\frac{1}{2}$$

9. (a) In a triangle ABC, a line is drawn parallel to base BC meeting AB in D and AC at E. If $\frac{AB}{BD} = 4$ and CE = 2 cm, then find the value of AE.

Ans. $\frac{AB}{DB} = \frac{AC}{EC}$

$$\frac{1}{2}$$

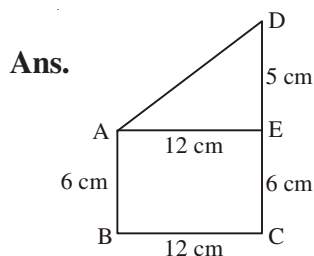
$$\Rightarrow AC = 8\text{cm}$$

$$\frac{1}{2}$$

$$AE = 6\text{ cm}$$

OR

- (b) Two poles, 6 m and 11 m high, stand vertically on the ground. If the distance between their feet is 12 m, find the distance between their tops.



$$AD^2 = (12)^2 + (5)^2$$

$$\frac{1}{2}$$

$$AD = 13\text{ cm}$$

$$\frac{1}{2}$$

10. From an external point P, tangents PQ and PR are drawn to a circle with centre O, touching the circle at Q and R. If $\angle QOR = 140^\circ$, find the measure of $\angle QPR$.

Ans. $\angle QPR = 180^\circ - 140^\circ$

$$\frac{1}{2}$$

$$= 40^\circ$$

$$\frac{1}{2}$$

11. Draw AB, a line segment of length 4.8 cm and find a point P on AB such that $AP = \frac{1}{4}AB$.

Ans. For correct steps of construction

1

12. In $\triangle ABC$, $\angle B = 90^\circ$ and $\tan A = \frac{1}{\sqrt{3}}$. Then find the value of $\sin A \cos C + \cos A \sin C$.

Ans. $\angle A = 30^\circ$, $\angle C = 60^\circ$

$$\frac{1}{2}$$

$$\sin 30^\circ \cos 60^\circ + \cos 30^\circ \sin 60^\circ$$

$$= 1$$

$$\frac{1}{2}$$

13. A solid sphere of radius r is melted and cast into the shape of a solid cone of height r . What is the radius of the base of the cone in terms of r ?

Ans. $\frac{4}{3}\pi r^3 = \frac{1}{3}\pi x^2 r$ (x is radius of cone)

$$\frac{1}{2}$$

$$4r^2 = x^2$$

$$x = 2r$$

$$\frac{1}{2}$$

14. (a) In a single throw of a pair of dice, find the probability that both dice have the same number.

Ans. Possible out comes = $\{(1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6)\}$

$$\frac{1}{2}$$

$$P = \frac{6}{36} \text{ or } \frac{1}{6}$$

$$\frac{1}{2}$$

OR

- (b) A card is drawn from a well-shuffled pack of 52 cards.

Find the probability that it is not an ace.

Ans. $P(\text{Not on ace}) = 1 - \frac{4}{52}$

$$\frac{1}{2}$$

$$\frac{48}{52} \text{ or } \frac{12}{13}$$

$$\frac{1}{2}$$

15. The coordinates of the three consecutive vertices of a parallelogram ABCD are A (1, 3), B (−1, 2) and C (2, 5). Find the coordinates of the fourth vertex D.

Ans. Let D (x , y)

$$\frac{x-1}{2} = \frac{1+2}{2}$$

$$\frac{1}{2}$$

$$x = 4$$

and, $\frac{y+2}{2} = \frac{3+5}{2}$

$$y = 6$$

$$\frac{1}{2}$$

16. If $x = a \sin \theta + b \cos \theta$ and $y = a \cos \theta - b \sin \theta$, then find the value of $(x^2 + y^2)$.

$$\begin{aligned} \text{Ans. } x^2 + y^2 &= a^2 \sin^2 \theta + b^2 \cos^2 \theta + 2ab \sin \theta \cos \theta + a^2 \cos^2 \theta + b^2 \sin^2 \theta - 2ab \sin \theta \cos \theta \\ &= a^2 + b^2 \end{aligned} \quad \frac{1}{2}$$

SECTION II

17. Answer any four of the following questions:

- (i) If the sum of the areas of two circles with radii r_1 and r_2 is equal to the area of a circle of radius r , then

(A) $r_1 + r_2 = r$

(B) $r_1^2 + r_2^2 = r^2$

(C) $r_1 + r_2 < r$

(D) $r_1^2 + r_2^2 < r^2$

Ans. (B) $r_1^2 + r_2^2 = r^2$ 1

- (ii) The area of a circle that can be inscribed in a square of side 8 cm is

(A) $64\pi \text{ cm}^2$

(B) $24\pi \text{ cm}^2$

(C) $16\pi \text{ cm}^2$

(D) $8\pi \text{ cm}^2$

Ans. (C) $16\pi \text{ cm}^2$ 1

- (iii) The area of a square that can be inscribed in a circle of radius 6 cm is

(A) 36 cm^2

(B) 72 cm^2

(C) 18 cm^2

(D) $36\sqrt{2} \text{ cm}^2$

Ans. (B) 72 cm^2 1

- (iv) The radius of a circle whose circumference is equal to the sum of the circumferences of two circles of diameters 36 cm and 20 cm is

(A) 56 cm

(B) 42 cm

(C) 28 cm

(D) 16 cm

Ans. (C) 28 cm

1

(v) If the circumference of a circle is equal to the perimeter of a square, then the ratio of their areas is

(A) 22 : 7

(B) 14 : 11

(C) 7 : 22

(D) 11 : 24

Ans. (B) 14 : 11

1

18. Answer any four of the following questions:

(i) ABC and BDE are two equilateral triangles such that D is the mid-point of BC. The ratio of the areas of the triangles ABC and BDE is

(A) 2 : 1

(B) 1 : 2

(C) 4 : 1

(D) 1 : 4

Ans. (C) 4 : 1

1

(ii) In $\triangle ABC$, $AB = 4\sqrt{3}$ cm, $AC = 8$ cm and $BC = 4$ cm. The angle B is

(A) 120°

(B) 90°

(C) 60°

(D) 45°

Ans. (B) 90°

1

(iii) The perimeters of two similar triangles are 35 cm and 21 cm respectively. If one side of the first triangle is 9 cm, then the corresponding side of the second triangle is

(A) 5.4 cm

(B) 4.5 cm

(C) 5.6 cm

(D) 15 cm

Ans. (A) 5.4 cm

1

- (iv) In a ΔABC , D and E are points on the sides AB and AC respectively such that $DE \parallel BC$ and $AD : DB = 3 : 1$. If $AE = 3.3$ cm, then AC is equal to

- (A) 4 cm
(B) 1.1 cm
(C) 4.4 cm
(D) 5.5 cm

Ans. (C) 4.4 cm

1

- (v) In an isosceles triangle ABC, if $AC = BC$ and $AB^2 = 2AC^2$, then $\angle C$ is equal to

- (A) 30°
(B) 45°
(C) 60°
(D) 90°

Ans. (D) 90°

1

19. Answer any four of the following questions:

- (i) The sum and the product of the zeroes of a quadratic polynomial are -1 and -12 respectively. The polynomial is

- (A) $x^2 - x - 12$
(B) $x^2 + x - 12$
(C) $x^2 - x + 12$
(D) $x^2 + x + 12$

Ans. (B) $x^2 + x - 12$

1

- (ii) The zeroes of the quadratic polynomial $x^2 + 20x + 91$ are

- (A) both positive.
(B) both equal.
(C) both negative.
(D) one positive and one negative.

Ans. (C) both negative.

1

- (iii) If the zeroes of the polynomial $5x^2 - 26x + k$ are reciprocal of each other, then the value of k is

- (A) 5

(B) -5 (C) $\frac{1}{5}$ (D) $-\frac{1}{5}$ **Ans.** (A) 5

1

(iv) If α, β are the zeroes of the polynomial $x^2 - 5x - 14$, then the value of $\alpha\beta - \alpha - \beta$ is(A) -9

(B) 19

(C) 9

(D) -19 **Ans.** (D) -19

1

(v) What should be added to the polynomial $x^2 - 5x + 4$ so that 3 is a zero of the resulting polynomial?

(A) 5

(B) 4

(C) 2

(D) 1

Ans. (C) 2

1

20. In the 100 m or 200 m races, usually stop-watches are used to correctly determine the time taken by each participant. In one such 100 m race, the following data is recorded:

Time (in seconds):	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
No. of Participants:	1	8	4	1	1

Based on the above data, answer any four of the following questions:

(i) The upper limit of the modal class is

(A) 10

(B) 20

(C) 30

(D) 40

Ans. (B) 20

1

(ii) The lower limit of the median class is

- (A) 0
- (B) 20
- (C) 10
- (D) 30

Ans. (C) 10

1

(iii) Cumulative frequency table is used in finding

- (A) mean
- (B) median
- (C) mode
- (D) All of the above

Ans. (B) median

1

(iv) How many participants completed the race within 40 seconds?

- (A) 9
- (B) 13
- (C) 15
- (D) 14

Ans. (D) 14

1

(v) How many participants took at least 20 seconds to complete the race?

- (A) 6
- (B) 12
- (C) 13
- (D) 14

Ans. (A) 6

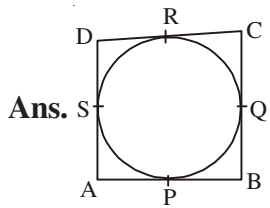
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PART B

SECTION III

All questions are compulsory. In case of internal choices, attempt any one.

21. A circle touches all the sides of a quadrilateral ABCD. Prove that $AB + CD = DA + BC$.



$$\left. \begin{array}{l} AP = AS \\ PB = BQ \\ DR = DS \\ CR = CQ \end{array} \right\} \text{(Tangents from external point)}$$

1

Adding we get

$$AP + DR + PB + CR = AS + DS + BQ + CQ$$

 $\frac{1}{2}$

$$\Rightarrow AB + DC = AD + BC$$

 $\frac{1}{2}$

22. (a) If $2 \sin 2A = \sqrt{3}$, then find the value of A.

Ans. $\sin 2A = \frac{\sqrt{3}}{2}$

1

$$2A = 60^\circ$$

 $\frac{1}{2}$

$$A = 30^\circ$$

 $\frac{1}{2}$

OR

- (b) If $7 \sin^2 \theta + 3 \cos^2 \theta = 4$, then show that $\tan \theta = \frac{1}{\sqrt{3}}$, $0^\circ < \theta < 90^\circ$.

Ans. $4 \sin^2 \theta + 3 \sin^2 \theta + 3 \cos^2 \theta = 4$

$$4 \sin^2 \theta = 1$$

$$\sin \theta = \frac{1}{2}$$

1

$$\theta = 30^\circ$$

 $\frac{1}{2}$

$$\tan \theta = \tan 30^\circ = \frac{1}{\sqrt{3}}$$

 $\frac{1}{2}$

23. Find the quadratic polynomial whose zeroes are $(\sqrt{5} - 4)$ and $(\sqrt{5} + 4)$.

Ans. Sum of zeroes = $\sqrt{5} - 4 + \sqrt{5} + 4 = 2\sqrt{5}$

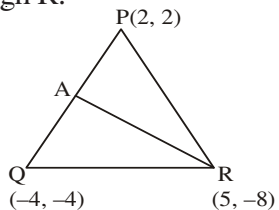
 $\frac{1}{2}$

$$\text{Product of zeroes} = (\sqrt{5}-4)(\sqrt{5}+4) = -11 \quad \frac{1}{2}$$

$$\text{Polynomial} = k(x^2 - 2\sqrt{5}x - 11) \quad 1$$

24. (a) If P (2, 2), Q (-4, -4) and R (5, -8) are the vertices of a ΔPQR , then find the length of the median through R.

Ans.



$$A\left(\frac{2-4}{2}, \frac{2-4}{2}\right)$$

$$A = (-1, -1)$$

1

$$AR = \sqrt{(5+1)^2 + (-8+1)^2} \quad \frac{1}{2}$$

$$= \sqrt{36+49}$$

$$= \sqrt{85} \quad \frac{1}{2}$$

OR

- (b) Find the ratio in which the y-axis divides the line segment joining the points A (5, -6) and B (-1, -4). Also, find the coordinates of the point of intersection.

Ans. Let required Ratio $k : 1$, Point on y axis be (0, y)

$$0 = \frac{-1k+5}{k+1}$$

$$k = 5 \quad 1$$

Ratio 5 : 1

$$y = \frac{-4(5)+(-6)}{6} = \frac{-26}{6} \quad \text{or} \quad -\frac{13}{3} \quad 1$$

25. If the sum of LCM and HCF of two numbers is 1260 and the LCM is 900 more than their HCF, find their LCM.

Ans. Let LCM = x

$$\text{HCF} = y$$

$$x + y = 1260$$

$$x = 900 + y \quad 1 \frac{1}{2}$$

On Solving

$$x = 1080$$

 $\frac{1}{2}$

26. Write the steps of construction of a circle of diameter 6 cm and drawing of a pair of tangents to the circle from a point 5 cm away from the centre.

Ans. For writing correct steps of construction

2

SECTION IV

27. Given that $\sqrt{2}$ is irrational, prove that $3\sqrt{2}$ is also irrational.

Ans. Let $3\sqrt{2} = x$, where x is rational

 $\frac{1}{2}$

$$\sqrt{2} = \frac{x}{3}$$

1

Irrational = Rational

 $\frac{1}{2}$

This is a contradiction because of our wrong assumption.

 $\frac{1}{2}$

Hence $3\sqrt{2}$ is irrational.

 $\frac{1}{2}$

28. (a) Find the ratio in which the line segment joining the points A (1, -5) and B (-4, 5) is divided by the x-axis. Also, find the coordinates of the point of division.

Ans. Let the required Ratio $k : 1$, Point on x axis be $(x, 0)$

$$0 = \frac{5k - 5}{k + 1}$$

1

$$k = 1$$

Ratio = 1 : 1

1

$$x = \frac{1 - 4}{2} = \frac{-3}{2}$$

1

Co-ordinate are $\left(\frac{-3}{2}, 0\right)$

OR

- (b) The points A (0, 3), B (-2, a) and C (-1, 4) are the vertices of a right triangle, right-angled at A. Find the value of a.

$$\text{Ans. } CB^2 = AB^2 + AC^2$$

1

$$(-2 + 1)^2 + (a - 4)^2 = (0 + 2)^2 + (3 - a)^2 + (0 + 1)^2 + (3 - 4)^2$$

1

$$\Rightarrow 1 + (a - 4)^2 = 4 + (3 - a)^2 + 1 + 1$$

$$\Rightarrow a = 1$$

1

29. (a) Find the values of m and n for which $x = 2$ and $x = 3$ are the roots of the quadratic equation $3x^2 - 2mx + 2n = 0$.

Ans. Sum of roots $= 5 = \frac{2m}{3}$

$$\Rightarrow m = \frac{15}{2}$$

 $1\frac{1}{2}$

Product of roots $= 6 = \frac{2n}{3}$

$$\Rightarrow n = 9$$

 $1\frac{1}{2}$ **OR**

- (b) Divide 19 into two parts such that sum of their squares is 193.

Ans. Let number are x and $(19 - x)$

 $\frac{1}{2}$

$$x^2 + (19 - x)^2 = 193$$

1

$$\Rightarrow x^2 - 19x + 84 = 0$$

1

$$\Rightarrow x = 7, 12$$

 $\frac{1}{2}$

30. The median of the following data is 525. Find the missing frequency x.

Class	Frequency
0 – 100	2
100 – 200	5
200 – 300	x
300 – 400	12
400 – 500	17
500 – 600	20
600 – 700	15
700 – 800	9
800 – 900	7
900 – 1000	4

Ans.

Class	fi	Cf
0 – 100	2	2
100 – 200	5	7
200 – 300	x	7 + x
300 – 400	12	19 + x
400 – 500	17	36 + x
500 – 600	20	56 + x
600 – 700	15	71 + x
700 – 800	9	80 + x
800 – 900	7	87 + x
900 – 1000	4	91 + x

Correct table

$1\frac{1}{2}$

$$\frac{n}{2} = \frac{91+x}{2}, \text{ Cf} = 36 + x$$

$$f = 20, h = 100, l = 500$$

$\frac{1}{2}$

Now,

$$525 = 500 + \left(\frac{\frac{91+x}{2} - (36+x)}{20} \right) \times 100$$

$\frac{1}{2}$

$$\Rightarrow x = 9$$

$\frac{1}{2}$

31. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

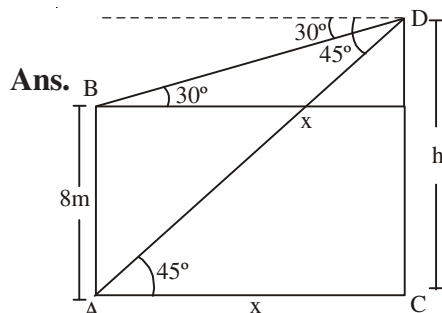
Ans. For correct given, To prove, construction.

$1\frac{1}{2}$

For correct proof

$1\frac{1}{2}$

32. The angles of depression of the top and bottom of an 8 m tall building from the top of a multi-storeyed building are 30° and 45° respectively. Find the height of the multi-storeyed building.



$$\tan 30^\circ = \frac{h-8}{x}$$

$$x = \sqrt{3}(h-8) \quad \dots(1)$$

1

$$\tan 45^\circ = \frac{h}{x}$$

$$\text{By (1) \& (2) } x = h$$

...(2)

1

$$8\sqrt{3} = \sqrt{3}h - h$$

$$\Rightarrow h = \frac{8\sqrt{3}}{\sqrt{3}-1} \text{ or } 4(3+\sqrt{3})$$

1

33. Find the mode of the following data.

Class	Frequency
0 – 10	5
10 – 20	10
20 – 30	18
30 – 40	30
40 – 50	20
50 – 60	12
60 – 70	5

$$\text{Ans. mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$$

$$= 30 + \left(\frac{30 - 18}{60 - 18 - 20} \right) \times 10$$

2

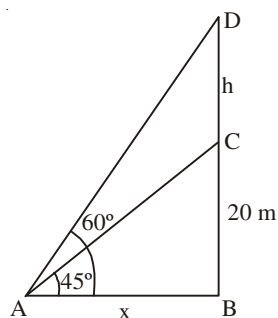
$$= \frac{390}{11} \text{ or } 35.45$$

1

SECTION V

34. (a) From a point on the ground, the angles of elevation of the bottom and top of a transmission tower fixed on the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower.

Ans.



$$\tan 45^\circ = \frac{20}{x}$$

$$x = 20$$

2

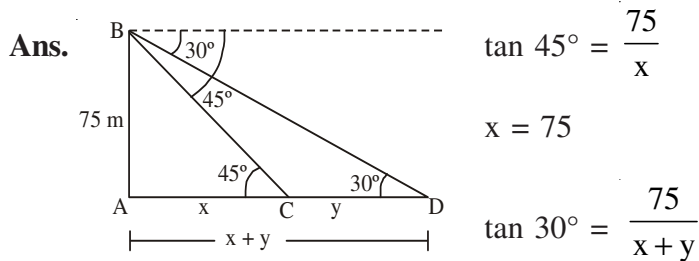
$$\tan 60^\circ = \frac{h + 20}{x}$$

$$20\sqrt{3} = h + 20 \quad 2$$

$$h = 20(\sqrt{3} - 1) \text{ m} \quad 1$$

OR

- (b) As observed from the top of a 75 m high lighthouse from the sea-level, the angles of depression of two ships are 30° and 45° . If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships.



$$\tan 45^\circ = \frac{75}{x}$$

$$x = 75 \quad 2$$

$$\tan 30^\circ = \frac{75}{x + y}$$

$$75 + y = 75\sqrt{3} \quad 2$$

$$y = 75(\sqrt{3} - 1) \quad 1$$

35. It takes 12 hours to fill a swimming pool using two pipes together. If the larger pipe is used for 4 hours and smaller pipe is used for 9 hours, only half of the pool is filled. How long will it take for each pipe alone to fill the pool?

Ans. Let time taken by larger Pipe = x hours

Smaller Pipe = y hours.

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{12} \quad 1 \frac{1}{2}$$

$$\frac{4}{x} + \frac{9}{y} = \frac{1}{2} \quad 1 \frac{1}{2}$$

On Solving, get

$$x = 20 \text{ hours} \quad 1$$

$$y = 30 \text{ hours} \quad 1$$

36. A solid right circular cone is 4.1 cm high and the radius of its base is 2.1 cm. Another solid right circular cone is 4.3 cm high and radius of its base is 2.1 cm. Both the cones are melted and recast into a sphere. Find the diameter of the sphere.

$$\text{Ans. } \frac{1}{3}\pi(2.1)^2(4.1) + \frac{1}{3}\pi(2.1)^2(4.3) = \frac{4}{3}\pi r^3 \quad 2$$

$$(2.1)^2[4.1 + 4.3] = 4r^3 \quad 1$$

$$(2.1)^3 = r^3 \quad 1$$

$$r = 2.1 \text{ cm} \quad \frac{1}{2}$$

$$d = 4.2 \text{ cm} \quad \frac{1}{2}$$