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Vedanta's

SEE CAPSULE-2082

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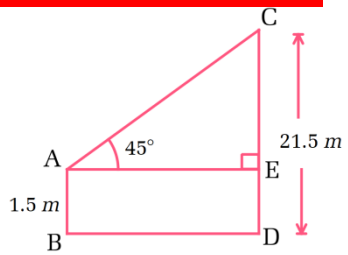
(Compulsory Mathematics)

DAY–6

SEE Q. No. 14

1. In the figure giv alongside, AB = the height of a man = 1.5 m, CD = the height of a tree = 21.5 m and ∠EAC = angel of elevation of the top of the tree as observed by the man = 45°.



(a) Define angle of elevation. [1K]

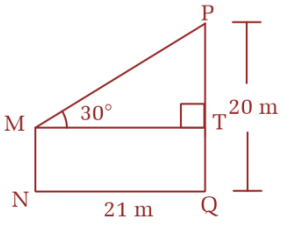
(b) By how much is the height of the man less than the height of the tree? [1U]

(c) Find the distance between the man and the tree. [1A]

(d) When the man looks at the top of the tree, how far should he move forward or backward from the current position so that the angle of elevation may be 30°? [1HA]

Ans: (b) 20 m (c) 20 m (d) 1.64 m backward

2. In the given figure, MN is the height of a pole, PQ is the height of a temple, NQ is the distance between the pole and the temple, and ∠TMP is the angle of elevation of the top of the temple from the top of the pole.



(a) Which angle represents the angle of elevation? [1K]

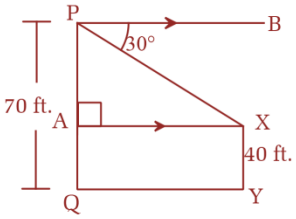
(b) By how much is the temple taller than the pole? [1U]

(c) Find the height of the pole? [1A]

(d) How many meters should the pole be moved towards the temple so that the angle of elevation of the top of the temple from the top of the pole becomes 45°? [1HA]

Ans: (a) ∠TMP (b) 12.12 m (c) 7.88 m (d) 8.88 m closer to the temple

3. In the figure given alongside, PQ is the hight of telephone tower, XY is the height of the a building of supermarket and ∠BPX is the angle of depression of the top of the building from the top of the tower.



(a) Define angle of depression. [1K]

(b) What is the measure of angle of elevation of the top of the tower as observed from the top of the building? [1U]

(c) Calculate the distance between the building and the tower. [1A]

(d) Compare the height of the tower and the distance of the top of the tower from the top of the building. [1HA]

Ans: (b) 30° (c) $30\sqrt{3}$ m (d) 7: 6

4. The distance between a tower and a house is one third of the height of the tower. The height of the tower is 60 m and the angle of depression of the roof of the house from the top of the tower is 45°.

(a) Define angle of depression. [1K]

(b) What is the distance between the house and the tower? [1U]

(c) Find the height of the house. [1A]

(d) By how many meters should the height of the house be lowered so that the angle of depression of the roof from the top of the top changes to 60°? [1HA]

Ans: (b) 20 m (c) 40 m (d) 14.64 m backward

5. A pine tree of height 21 m is broken by the wind so that its top touches the ground and makes an angle of 30° with the ground.

(a) If the length of broken part of the tree is x m, express the length of the remaining part of the tree in terms of x. [1K]

(b) Sketch a figure according to the given context. [1U]

(c) Find the length of broken part of the tree. [1A]

(d) If the sun's altitude of the remaining part of the tree is 45°, find the length of the shadow of the remaining part of the tree on the ground. [1HA]

Ans: (c) 14 m (d) 7 m

6. Ram, a 5 ft. tall boy, is flying a kite. The length of string of the kite is $100\sqrt{3}$ m and the height of the kite from the ground is 155 ft.

(a) Sketch a figure according to the given context. [1U]

(b) By how many feet is the height of the kite more than the height of the Ram? [1K]

(c) Find the angle made by the string of the kite with the horizon. [1A]

(d) If the angle made by the string of the kite with horizon is 45°, by how much more or less string is required to have the same height of the kite from the ground? [1HA]

Ans: (b) 150 ft. (c) 60° (d) 38.93 ft. more

7. On the occasion of a festival, 1. 5 m tall Ramesh is flying a kite. The length of the string is 120 m and the string of the kite makes an angle of 30° with the horizon.

(a) Sketch a figure according to the given context. [1U]

(b) By how much is the height Ramesh less than the height of the kite? [1K]

(c) Find the height of the kite from the ground. [1A]

(d) If the angle made by the string of the kite with horizon is 45°, by how much more or less string is required to have the same height of the kite from the ground? [1HA]

Ans: (b) 60 m (c) 61.5 m (d) less by 35.15 m

8. The circumference of a circular pond is 176 m. A pole is fixed at the centre of the pond. From a point on the edge of the pond, a man of 1.6 m tall observed the angle of elevation of the top of the pole and found it be 45°.

(a) Define angle of elevation. [1K]

(b) Find the distance between the man and the pole. [1U]

(c) What is the height of the pole above the water surface? Find it. [1A]

(d) By how much less should the height of the pole above the water surface such that it would have made the angle of elevation of 30°? [1HA]

Ans: (b) 28 m (c) 29.6 m (d) less by 11.84 m

9. A house and a tower are situated at the same plain ground. The house is 20 m tall and the angle of the depression of the roof of a house from the top of the tower is 60°.

(a) What is the angle of elevation of the top of the tower form the roof of the house? [1K]

(b) Draw a figure according to the given context. [1U]

(c) What is the height of the house? Find it. [1A]

(d) By how many meters should the observer go down from the top of the tower to observe the roof of the house such that the angle of depression of 45°? [1HA]

Ans: (a) 60° (c) 54.64 m (d) 14.64 m downward

10. Two buildings of heights 40 m and 55 m are constructed 15 m apart on a ground.

(a) What type of angle is formed when an observer observed from the roof of the taller building to the roof of the shorter building? [1K]

(b) Explain with reason the relation between the angle that forms when an observer observes the top of the taller building from the top of the shorter building and the top of the shorter building from the top of the taller building. [1U]

(c) Calculate the angle in degree, when an observer observes from the roof of the shorter building to the roof of taller building. [1A]

(d) If the ladder is fixed from the top of the small building to the top of the big building, what should be the length of the ladder? Calculate it. [1HA]

Ans: (a) Angle of depression (b) Altenate angles (c) 45° (d) 21.21 m

SEE Q. No. 15

1. The given table represents the marks obtained by the students of class 10 of a school in an examination in mathematics.

Marks obtained	0-15	15-30	30-45	45-60	60-75
No. of students	3	4	10	8	5

(a) What does '*c.f.*' stand for in the formula for calculating the median of continuous data,

$$M_d = L + \left(\frac{N/2 - c.f.}{f}\right) \times i?$$ [1K]

(b) Calculate the median mark. [2U]

(c) Find the average mark. [2A]

(d) Compare the number of students whose scores lie in the modal class and the median class. [1HA]

Ans: (a) The cumulative frequency of pre-median class (b) 42 (c) 41.5 (d) Equal

2. The per hour earning (in Rs) of 30 people in a community are given in the following table.

Income (In Rs)	0-50	50-100	100-150	150-200	200-250
No. of People	6	4	7	5	8

(a) Find the modal class. [1K]

(b) Calculate the average income per hour. [2U]

(c) Find the maximum amount received by below 75% people. [2A]

(d) State whether the measures of central tendency (mean, median and mode) lie in the same class interval or not. Write with reason. [1HA]

Ans: (a) 200-250 (b) Rs. 133.33 (c) Rs. 203.13 (d) No

3. The following table represents the height of students of class X of a school. The average height of the students is 132.5 cm.

Height (in cm)	110-120	120-130	130-140	140-150
No. of students	5	k	15	10

(a) What does 'm' denote in the formula, $\overline{X} = \frac{\sum fm}{N}$? [1K]

(b) Calculate the value of k. [2A]

(c) Find the mode. [2U]

(d) What percent of students have height less than 140 cm? [1HA]

Ans: (a) mid-value (b) 10 (c) 135 cm (d) 75%

4. The marks obtained by the students in an examination are as follows.

Age (in years)	0 – 10	10 – 20	20 - 30	30 - 40	40 - 50
No. of people	4	12	x	9	5

(e) If the median of this data is 24, identify the median class. [1K]

(f) Calculate the value of x. [2A]

(g) Find the mean. [2U]

(h) Compare the number of people falling in median and modal classes. [1HA]

Ans: (a) 20-30 (b) 10 (c) 24.75 (d) 6:5

5. The wight of the a group of people are given in the table below.

Weight in kg	30-40	40-50	50-60	60-70	70-80
Number of people	3	6	7	11	3

(a) What does f_1 represent in the formula $M_o = L + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$ for the calculation of mode of the grouped data? [1K]

(b) Find the modal age. [2U]

(c) Calculate the average shoes size. [2A]

(d) What percent of people are there whose weights are below the median class? [1HA]

Ans: (a) Frequency of modal class (b) 68 kg (c) 56.67 kg (d) 30%

6. The following are the marks obtained by the students in a Math Test.

53, 27, 63, 53, 46, 58, 78, 21, 39, 51, 32, 43, 52, 59, 33, 45, 40, 32, 60, 63

(a) Write the formula for calculating Q_1 of a continuous data. [1K]

(b) Prepare a frequency distribution table with a class interval of 10 taking the first class interval 20-30 from the above data. Also, find the mean. [2U]

(c) Find the mode from the frequency table. [2A]

(d) Are the modal class and third quartile class same in the given data? Write with reason. [1HA]

Ans: (a) $Q_1 = L + \left(\frac{N/4 - c.f.}{f}\right) \times i?$ (b) 48.5 (c) 54 (d) Yes

7. The following are the marks obtained by the students in a Math Test.

21, 9, 34, 42, 17, 54, 13, 38, 23, 39, 49, 29, 38, 44, 21, 42, 19, 7, 29, 8, 55, 36, 39, 13

(a) Write the formula for calculating Q_3 of a continuous data. [1K]

(b) Prepare a frequency distribution table with a class interval of 10 from the above data. Also, find the median. [2A]

(c) Find the mean from the frequency table. [2U]

(d) Compare the number of students below and above the modal class. [1HA]

Ans: (a) $Q_3 = L + \left(\frac{3N/4 - c.f.}{f}\right) \times i?$ (b) 30 (c) 29.17 (d) 2: 1

8. The marks obtained by 40 students of Janasewa Secondary School in Mathematics are given in the table below.

Obtained marks	0-10	10-20	20-30	30-40	40-50	50-60
Number of students	4	6	8	5	7	10

(a) Write the formula for finding the first quartile of the continuous series. [1K]

(b) Find the first quartile. [2U]

(c) Calculate the average marks. [2A]

(d) What should be the number of students in the class with 50-60 in order to make 30 as the average marks of students? Calculate and write it. [1HA]

Ans: (a) $Q_1 = L + \left(\frac{N/4 - c.f.}{f}\right) \times i$ (b) 20 (c) 33.75 (d) 4

9. The given data represents the monthly expenditure (in thousands) of the families of Ramkot village

Expenditure (Rs. 000)	10-20	20-30	30-40	40-50	50-60
Number of families	30	20	60	50	40

(a) Which value of the data divides the expenditure into two equal parts? [1K]

(b) From the above data, write the class interval of mode. [1K]

(c) What is the expenditure of the maximum family? [2U]

(d) Biraj said that mode and median lie on the same class interval. Evaluate her statement. [1HA]

Ans: (a) Median (b) 30-40 (c) Rs 38,000 (d) Yes, both are in the same class (30–40)

SEE Q. No. 15

1. From well-shuffled pack of 52 playing cards, two cards are drawn one after another at random without replacement.

(a) If A and B are any two mutually exclusive events, what is the formula for finding the probability, P (A or B)? [1K]

(b) Find the probability of getting an ace or a king in the first draw. [1U]

(c) When both cards are drawn, show the probabilities of all the possible outcomes of king and not king in a tree diagram. [2A]

(d) Find the ratio of probabilities of getting both kings when the cards drawn at first is replaced and not replaced in the pack. [1HA]

Ans: (a) P (A or B) = P (A) + P (B) (b) $\frac{2}{13}$ (d) 17: 13

2. Roshani planned to have two children at an interval of 4 years after getting married.

(a) What is the probability scale of any event 'E'? Write it. [1K]

(b) Find the probability of having both children are daughter. [1A]

(c) Show the probabilities of possible outcomes of getting son and daughter in a tree-diagram. [2U]

(d) Find the probability of having at least one son. [1HA]

Ans: (a) $0 \leq P(E) \leq 1$ (b) $\frac{1}{4}$ (d) $\frac{3}{4}$

3. A bag contains 4 red and 8 green balls of the same shape and size.

(a) Define independent events. [1K]

(b) If the balls are drawn one after another (without replacement), find the probability of getting both balls are red. [1U]

(c) If two balls are drawn one after another (with replacement), show the probability of all the possible outcomes in a tree diagram. [2A]

(d) Ramila said that both of the above conditions are independent. Is she correct? Write with reason. [1HA]

Ans: (b) $\frac{1}{11}$ (d) No, only events in second condition

4. A six faced unbiased die is rolled once.

(a) State addition law of probability for mutually exclusive events A and B. [1K]

(b) What is the probability of getting even number or odd number? [1A]

(c) If the die is rolled again second time, show the probabilities of possible outcomes of getting and not getting prime numbered face in a tree diagram. [2U]

(d) Compare the probabilities of getting both prime numbered and not getting both prime numbered faces. [1HA]

Ans: (a) P (A ∪ B) = P(A) + P(B) (b) 1 (d) 1: 3

5. From the set of 20 cards numbered from 1 to 20, a card is drawn randomly

(a) State addition law of probability for mutually non-exclusive events A and B. [1K]

(b) Find the probability of getting a number that is either divisible by 4 or by 3. [1A]

(c) If the card so drawn in the first trial is not replaced and another card is randomly drawn, show the probabilities of possible outcomes of getting and not getting a factor of 20 in a tree diagram. [2U]

(d) Find the probability of getting both cards with factors of 20 in percentage. [1HA]

Ans: (a) P (A ∪ B) = P(A) + P(B) – P(A ∩ B) (b) $\frac{1}{2}$ (d) 7.89%

6. Two cards are drawn randomly one after another without replacement from a well shuffled deck of 52 cards.

(a) If two events A and B are independent events, what is the formula for finding P(A ∩ B)? Write it. [1K]

(b) Find the probability of getting both are faced card. [1U]

(c) Show the probability of all the possible outcomes of getting or not-getting faced card in a tree diagram. [2A]

(d) If two cards are drawn randomly one after another with replacement, how many times more is the probability that both are faced cards than the probability that both cards are ace? [1HA]

Ans: (a) P(A ∩ B) = P (A) × P (B) (b) $\frac{11}{221}$ (d) 9 times

7. There are one yellow, one red and one white sweet of same shape and size in a bag.

(a) If a sweet is drawn at random, find the probability of getting red or white sweet. [1K]

(b) A sweet is drawn randomly and with replacing the sweet, another sweet is drawn from the bag, show the probabilities of all possible outcomes in a tree-diagram. [2U]

(c) Write the sample space. [1A]

(d) What is the percentage of probability of getting red sweet in first time and white sweet in second time? [1HA]

Ans: (a) $\frac{2}{3}$ (c) S = {YY, YR, YW, RY, RR, RW, WY, WR, WW} (d) 11.11%

8. A bag contains 4 red and 8 green balls of the same shape and size.

(a) Define independent events. [1K]

(b) If the balls are drawn one after another (without replacement), find the probability of getting both balls are red. [1U]

(c) If two balls are drawn one after another (with replacement), show the probability of all the possible outcomes in a tree diagram. [2A]

(d) Ramila said that both of the above conditions are independent. Is she correct? Write with reason. [1HA]

Ans: (b) $\frac{1}{11}$ (d) No, only events in second condition