



Stage III



Grades 7-8

CREST Teacher Mathematics Olympiad (CTMO)

Sample Paper

Pattern and Marking Scheme

Stage	Topic/Section	No. of Questions	Marks per Question	Total Marks
For stage III (Grades 7-8)	Practical Mathematics	30	3	90
	Achiever's Section	20	6	120
Grand Total		50		210

The total duration of the exam is 60 minutes.

Note: For every incorrect answer, there's a penalty of 1/3rd of the total marks allotted to that question.

Syllabus

Number system, Expressions and equations, Comparing quantities, Coordinate geometry, Trigonometry, Geometry, Statistics and data handling

For more details visit: <https://www.crestolympiads.com/teacher-mathematics-olympiad>

Practical Mathematics (Each Question is 3 Marks)

- If p and q are whole numbers such that $p^q = 361$, then find the value of:
 $[(6 - q)^{(p-17)}]^{-1}$
 - $\frac{1}{64}$
 - $\frac{1}{8}$
 - $\frac{1}{16}$
 - $\frac{1}{32}$
- If a positive integer is multiplied by 64, then the product is equal to the cube of that integer. Find the difference in the cube and the square of the integer.
 - 448
 - 48
 - 192
 - 576
- A milkman has 153 litres of milk. He put all milk into two vessels M and N such that $\frac{8^{\text{th}}}{9}$ part of the milk put in vessel M is equal to the milk in vessel N. How much milk is there in vessel N?
 - 88 litres
 - 72 litres
 - 81 litres
 - 112 litres
- Which statement is needed to find the speed of a boat in still water?

Statement 1: It takes 3 hours to cover the distance (in km) between two points A and B downstream.

Statement 2: It takes 5 hours to cover the distance (in km) between A and B in upstream.

 - Only Statement 1
 - Only Statement 2
 - Both Statements 1 and 2
 - Neither Statements 1 nor Statement 2
- At a shop, the bulk price for sugar is $\$(x)$, with a minimum purchase of 15 kg, where $x < 10$.
 - What is the cost of 16 kg of sugar?
 - If Jack paid $\$63$ for some sugar, by how much sugar did Jack's purchase exceed the minimum?
 - 1- $\$(15x)$, 2- $[63/x - 15]$ kg
 - 1- $\$(16x)$, 2- $[15x/63 - 15]$ kg
 - 1- $\$(16x)$, 2- $[63/x - 15]$ kg
 - 1- $\$(16x)$, 2- $[15/x - 63]$ kg
- Marry has some apples as much greater than 12 apples as it is less than 54 apples. If she gave 3 apples less than one-third of all apples to her brother, how many apples does she have now?
 - 29 apples
 - 25 apples
 - 26 apples
 - 19 apples
- Alisha is 18 years younger than Zelensky. Four years later, Zelensky will be thrice as old as Alisha. After 20 years, what will be the sum of their ages?

- a. 68 years
- b. 62 years
- c. 58 years
- d. 72 years

8. 24 women can do a piece of work in 24 days. How many more women are needed to complete the same piece of work in 18 days?

- a. 6 women
- b. 8 women
- c. 12 women
- d. 4 women

9. Harry has n stickers. Tony has $\frac{3}{4}$ of n stickers and Mory has $\frac{5}{3}$ of n stickers. By what percent less number of stickers does Tony have than Mory?

- a. 35%
- b. 55%
- c. 65%
- d. 45%

10. If an agent receives a \$12.50 commission at a rate of 2.5% on the sale of cloth, what is the total value of the cloth that was sold through him on that specific day?

- a. \$500
- b. \$400
- c. \$300
- d. \$200

11. 12.5% part of a pencil is black, 50% part of the remaining is white. If the white part is 7 cm long, then find the length of 32% part of the pencil.

- a. 4.36 cm
- b. 5.12 cm
- c. 4.48 cm
- d. 5.24 cm

12. The perimeter of a rectangle is 70 m. If the ratio of its length and breadth is 4 : 3, then what is the area of the rectangle?

- a. 300 cm²
- b. 320 cm²
- c. 340 cm²
- d. 360 cm²

13. In a polyhedron, there are 7 faces and the number of edges is one more than twice the number of its faces. How many vertices does this polyhedron have?

- a. 9
- b. 13
- c. 10
- d. 11

14. Fill in the blanks:

1. If the difference between the circumference and the diameter of a circular park is 420 m, then the radius of the circular park is_____.
2. If I make a square-shaped figure from a circular wire of radius 56 cm, then the difference in areas covered by the square-shaped figure and the circular wire will be_____.
[Use $\pi = \frac{22}{7}$]

- a. 1-196 m, 2-1056 cm²
- b. 1-98 m, 2-1056 cm²
- c. 1-98 m, 2-2112 cm²
- d. 1-196 m, 2-2112 cm²

15. A hollow cylinder is cut along its height to form a rectangular sheet of width 32 cm. If the perimeter of the rectangular sheet is 328 cm, then find the lateral surface area of a hollow cylinder.

- a. 4824 cm^2
- b. 4842 cm^2
- c. 4248 cm^2
- d. 4224 cm^2

16. The sum of 5 consecutive positive integers is a perfect cube. What is the smallest possible value of this sum?

- a. 64
- b. 125
- c. 216
- d. 512

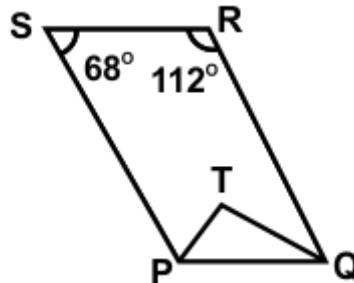
17. Some boxes can be arranged in groups of 30, 40, 60 or 80 with no box left behind. If all the boxes are arranged in 7 groups equally, then how many boxes will left behind?

- a. 1
- b. 2
- c. 3
- d. 4

18. The sum of two numbers is 780 and their HCF is 65. The number of such pairs is :

- a. 2
- b. 3
- c. 4
- d. 5

19. In the shown figure, the bisectors of angle P and angle Q meet at a point T. If $\angle R = 112^\circ$ and $\angle S = 68^\circ$, then find the measure of angle PTQ.



- a. 70°
- b. 110°
- c. 80°
- d. 90°

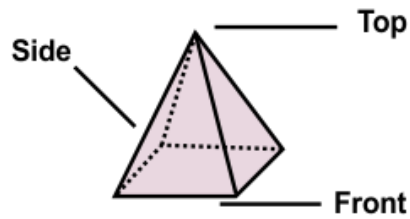
20. Which one of the following is correct for the statements given below?



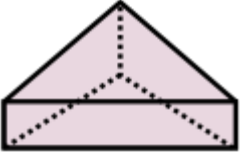
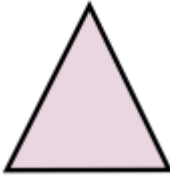
Statement 1: If one angle of a parallelogram is known, then the minimum number of other measurements are required for the construction of a unique parallelogram is 2.

Statement 2: The minimum number of measurements are required for the construction of a rectangle is 2.

- a. Statement 1 is true and 2 is false.
- b. Statement 2 is true and 1 is false.
- c. Both Statements 1 and 2 are true.
- d. Both Statements 1 and 2 are false.

21. For the given solid, identify the top view:



- a. 
- b. 
- c. 
- d. 

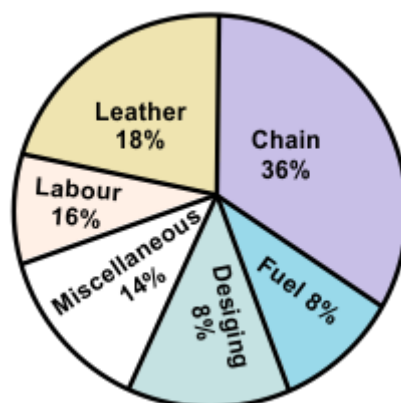
22. The following are the marks obtained by 50 students in Mathematics in their previous examination held in their school. Find the range of the data given below:

65, 68, 41, 87, 61, 44, 67, 30, 54, 18, 39, 60, 37, 50, 19, 8, 42, 29, 32, 61, 25, 77, 62, 91, 7, 36, 15, 40, 9, 25, 34, 50, 61, 75, 51, 96, 20, 13, 18, 35, 43, 88, 25, 95, 68, 81, 29, 41, 45, 57.

- a. 88
b. 91
c. 89
d. 90

23. The given pie graph shows the percentage expenditure on production of an article on various items:

If the expenses on Labour is \$1620, then what is the expenses on Fuel?



- a. \$810
b. \$720
c. \$880
d. \$790

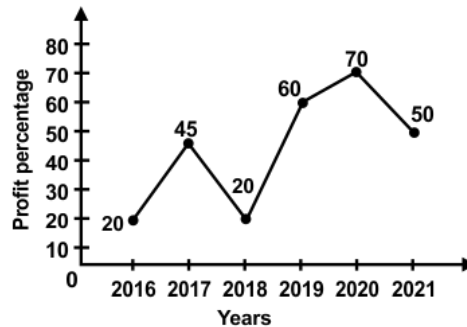
24. One card is drawn from a well-shuffled deck of 52 cards. Find the probability that the number on the card drawn is a multiple of even prime number.

- a. $\frac{1}{26}$
c. $\frac{4}{13}$

- b. $\frac{3}{26}$
d. $\frac{5}{13}$

25. The following line graph gives the annual profit percent earned by a company during 2016 - 2021.

During which year, the ratio of the percentage of profit earned to that in the previous year is maximum?

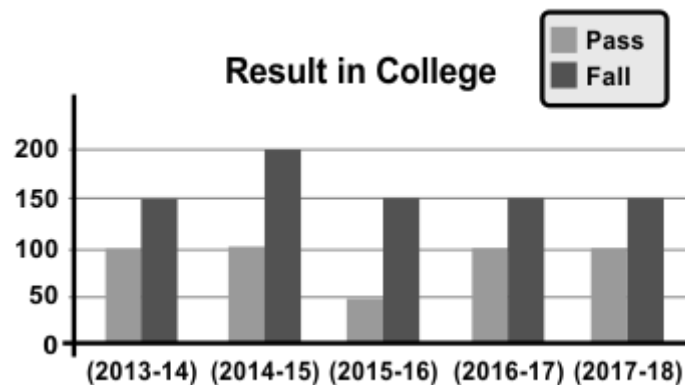


- a. 2018
c. 2020

- b. 2019
d. 2021

26. Given bar graph depicts the results of a college's students:

In the last five years, what was the average number of students who passed in college?



- a. 80
c. 90

- b. 85
d. 95

27. If the range of 100 observations is 72 and its lowest score of the data is 14, then what is the highest score of data?

- a. 58
c. 43

- b. 86
d. 29

28. Calculate the compound interest on an investment of \$7812.5 at an annual interest rate of 16% compounded quarterly for a period of 9 months.

- a. \$975.5
c. \$1005

- b. \$985.52
d. \$1212

29. Tom borrowed \$1,500 from his friend at an annual interest rate of 8%. He plans to pay back the money in 2 years. Calculate the total amount he will have to repay.
- a. \$1740
 - b. \$1840
 - c. \$1900
 - d. \$2120
30. If the profit gained by selling an article for \$900 is twice the loss incurred when selling the same article for \$450, what should be the selling price of the article to achieve a 25% profit?
- a. \$450
 - b. \$550
 - c. \$650
 - d. \$750

Achievers' Section (Each Question is 6 Marks)

31. If R is an integer between 1 and 9, $P - R = 1870$ and P is divisible by 9, then what is the value of $(P + R + 1)/3$?
- a. 621
 - b. 622
 - c. 625
 - d. 628

32. Which one of the following is correct for the statements given below?

Statement 1: If five more than six times a number is three less than eight times the same number, then the fifth multiple of the number is 30.

Statement 2: If the 5-digit number $2a6b5$ is divisible by 9 in which a is the greatest single digit perfect cube, then the value of $(a + b)$ is 14.

- a. Statement 1 is true and 2 is false.
- b. Statement 2 is true and 1 is false.
- c. Both Statements 1 and 2 are true.
- d. Both Statements 1 and 2 are false.

33. Which one of the following is correct for the statements given below?

Statement 1: The sum of $(\sqrt{4})^{-3}$ and $(\sqrt{4})^3$ is equal to $16^{1/16}$.

Statement 2: If $2^x \div 2^{-3} = 4^4$, then the value of x is 4.

- a. Statement 1 is true and 2 is false.
- b. Statement 2 is true and 1 is false.
- c. Both Statements 1 and 2 are true.
- d. Both Statements 1 and 2 are false.

34. When 52 is divided by x , the remainder is $x - 4$. If x be a natural number, then total how many values are possible for x ?

- a. 3
- b. 4
- c. 5
- d. 6

35. Choose the CORRECT statement given below:

Statement 1: If three times of my age 7 years ago is equal to 7 less than two times of my age 7 years hence, then I am 21 years old.

Statement 2: If my age is four times the age my son and the sum of our ages is 70 years, then after 7 years, my age will be three times my son's age.

- a. Only Statement 1
- b. Only Statement 2
- c. Both Statements 1 and 2
- d. Neither Statements 1 nor Statement 2

36. What amount is to be repaid on a loan of \$2000 for $1\frac{1}{2}$ years at 20% per annum compounded half-yearly?

- a. \$2562
- b. \$2662
- c. \$2752
- d. \$2860

37. A brass pipe is open at both ends and is made of 2 mm thick metal. Its external diameter is 14 mm and height is 105 mm. Find the weight of the pipe if 1 mm^3 of the brass weighs 8.5 mg. [Use $\pi = 22/7$]



- a. 67.32 g
- b. 63.72 g
- c. 62.37 g
- d. 62.73 g

38. Herry exchanges friendship bands with his friends. For every band he gives someone, he gets 6 bands back. Suppose, he starts the exchange with just one band. How many bands will he have over 90 exchanges?

- a. 463
- b. 453
- c. 456
- d. 451

39. Which one of the following is correct for the statements given below?

Statement 1: In a class, each of the students contributed as many dollars as there are the number of students. If the total collection was \$324, then the number of students in the class is 18.

Statement 2: If $(1600 \times x)$ is a perfect cube number in which x is the smallest possible natural number, then the cube root of $(1600 \times x)$ will be 20.

- a. Statement 1 is true and 2 is false.
- b. Statement 2 is true and 1 is false.
- c. Both Statements 1 and 2 are true.
- d. Both Statements 1 and 2 are false.

40. Fill in the blanks and select the correct option:

1. The length of the diagonal of the cuboid whose dimensions are 20, 10 and 30 cm will be _____.
2. The length of the diagonal of the cube whose one side is 10 cm will be _____.
3. The length of the face diagonal of a cube with each side equal to 10 cm will be _____.

- a. $1-10\sqrt{3}$ cm, $2-10\sqrt{14}$ cm, $3-10\sqrt{2}$ cm
- b. $1-10\sqrt{14}$ cm, $2-10\sqrt{3}$ cm, $3-10\sqrt{2}$ cm
- c. $1-10\sqrt{14}$ cm, $2-10\sqrt{3}$ cm, $3-10\sqrt{41}$ cm
- d. $1-10\sqrt{14}$ cm, $2-10\sqrt{2}$ cm, $3-10\sqrt{3}$ cm

41. Which one of the following is correct for the statements given below?

Statement 1: If the diagonals of a rectangle ABCD intersect at O and angle COB = 50° , then angle OAD = 75° .

Statement 2: If the two adjacent angles of a parallelogram are in the ratio 5 : 7, then the sum of any three angles of the parallelogram will be either 255° or 285° .

- a. Statement 1 is true and 2 is false.
- b. Statement 2 is true and 1 is false.
- c. Both Statements 1 and 2 are true.
- d. Both Statements 1 and 2 are false.

42. Fill in the blanks and select the correct option:

1. There are 9 edges in a _____.
2. There are 4 vertices in a _____.
3. Difference in the numbers of edges and vertices is 4 in a _____.
4. _____ has less than 3 faces.

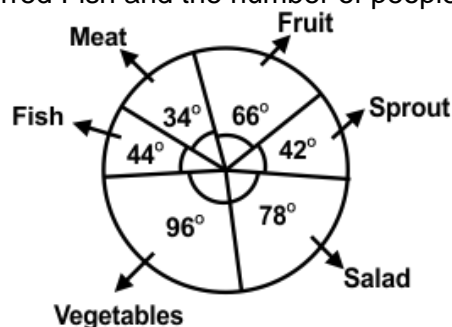
- a. 1-triangular pyramid, 2-rectangular prism 3-cuboid, 4-Cylinder
- b. 1-rectangular prism, 2-triangular pyramid, 3-cuboid, 4-Cylinder
- c. 1-rectangular prism, 2-triangular pyramid, 3-cylinder, 4-Cuboid
- d. 1-triangular pyramid, 2-rectangular prism, 3-cylinder, 4-Cuboid

43. When the third multiple of 4 is multiplied with the fourth multiple of 5, the product so obtained is fifth multiple of x. When the seventh multiple of 8 is divided by one-third of x, the remainder so obtained is:

- a. the second multiple of 3
- b. the fourth multiple of 2
- c. the smallest composite number
- d. half of the smallest 2-digit number

44. Given pie graph represents the degree-wise break-up of the food item preference of the people on a survey conducted in a locality:

1. If 9000 people participated in the survey then how many people preferred Salad as their food items?
2. If 9000 people participated in the survey, then what is difference between the number of people who preferred Fish and the number of people who preferred Meat?



- a. 1-1880, 2-250
- b. 1-1950, 2-350
- c. 1-1880, 2-150
- d. 1-1950, 2-250

45. A die is thrown. What is the probability of getting:

1. 3 or 6.
2. a multiple of 1.
3. one-digit smallest composite number?

- a. $1\frac{1}{3}$, $2\frac{1}{6}$, 3-1
 c. $1\frac{1}{6}$, 2-1, $3\frac{1}{3}$
- b. $1\frac{1}{4}$, 2-1, $3\frac{1}{6}$
 d. $1\frac{1}{3}$, 2-1, $3\frac{1}{6}$
- 46.** A rectangular sheet of paper is having measures 22 cm × 8 cm. It is folded without overlapping to make a cylinder of height 8 cm. The volume of the cylinder will be _____.
- a. 616 cm^3
 c. 154 cm^3
- b. 308 cm^3
 d. 308 cm^3
- 47.** What is the width of the rectangular field if its area is 460 m² and its length is 15% greater than the width?
- a. 20 m
 c. 28 m
- b. 24 m
 d. 30 m
- 48.** The ratio of the volume to the surface area of a sphere is 54 cm. Find the radius of the sphere.
- a. 149 cm
 c. 172 cm
- b. 162 cm
 d. 181 cm
- 49.** P can complete a work in 12 days working 8 hours a day. Q can complete the same work in 8 days working 10 hours a day. If both P and Q work together, working 8 hours a day, how many days can they complete the work?
- a. $5\frac{5}{11}$
 c. $7\frac{7}{11}$
- b. $6\frac{6}{11}$
 d. $8\frac{8}{11}$
- 50.** A man sold two flats for \$67850 each. On one he gains 16% while on the other he losses 16%. How much does he gain or loss in the whole transaction?
- a. \$1245.20
 c. \$1736.96
- b. \$1452.22
 d. \$2320.23

Answer Key

- | | | | | | | | | | | | | | |
|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
| 1. | c | 2. | a | 3. | b | 4. | c | 5. | c | 6. | b | 7. | a |
| 8. | b | 9. | b | 10. | a | 11. | b | 12. | a | 13. | c | 14. | c |
| 15. | d | 16. | b | 17. | b | 18. | a | 19. | d | 20. | c | 21. | b |
| 22. | c | 23. | a | 24. | d | 25. | B | 26. | C | 27. | b | 28. | A |
| 29. | A | 30. | d | 31. | c | 32. | b | 33. | d | 34. | d | 35. | b |
| 36. | b | 37. | a | 38. | d | 39. | c | 40. | b | 41. | b | 42. | b |
| 43. | b | 44. | d | 45. | d | 46. | b | 47. | a | 48. | b | 49. | a |
| 50. | c | | | | | | | | | | | | |