S3 Mathematics Practice Paper (Set 1) | Percentage growth, ratio and variation, quadratic equations, mensuration, probability and statistics, coordinate geometry

S3 Mathematics | Time allowed: 75 minutes | Total: 100 marks | 24 questions

Section A: Percentages and growth

Question 1 (16 marks)

1. A jacket is marked at 640 dollars. A shop gives a 15% discount and then a further 10% discount on the discounted price. Find the final selling price. (4 marks)

2. Find the single equivalent discount rate of the two successive discounts. (4 marks)

3. The population of a city rises from 250 000 to 280 000. Find the percentage increase in population. (4 marks)

4. Someone claims that a 20% increase followed by a 20% decrease brings the price back to its original level. Use a calculation to show whether this claim is correct. (4 marks)

Section B: Ratio and variation

Question 2 (16 marks)

5. It is given that y varies directly as the square of x, and y = 45 when x = 3. (i) Find the constant of variation k. (ii) Find y when x = 5. (4 marks)

6. It is given that z varies inversely as w, and z = 15 when w = 8. Find z when w = 12. (4 marks)

7. An amount of 4 200 dollars is divided between A and B in the ratio 3 : 4. Find the amount each receives. (4 marks)

8. Compare the graphs of a direct proportion and an inverse proportion. (4 marks)

Section C: Algebraic fractions and quadratic equations

Question 3 (18 marks)

9. Simplify (x^2 - 9) / (x^2 + x - 12) and state the restrictions on x. (5 marks)

10. Solve the equation 2x^2 + 3x - 2 = 0. (5 marks)

11. Solve the equation x^2 + 6x - 7 = 0 by completing the square. (4 marks)

12. The quadratic equation x^2 + kx + 9 = 0 has a repeated root. Find the possible values of k. (4 marks)

Section D: Mensuration

Question 4 (18 marks)

13. A cylinder has radius 7 cm and height 20 cm. Find its volume in terms of pi, correct to 1 decimal place. (4 marks)

14. A cone has radius 7 cm and height 24 cm. Find its volume in terms of pi, correct to 1 decimal place. (4 marks)

15. A sphere has radius 6 cm. Find its surface area and its volume in terms of pi, correct to 1 decimal place. (5 marks)

16. The cylinder in part (a) is melted and recast into solid spheres of radius 7 cm. Find the greatest number of spheres that can be made. (5 marks)

Section E: Probability and statistics

Question 5 (16 marks)

17. A bag contains 5 red, 3 blue and 2 green balls. A ball is drawn at random. Find the probability that it is not red. (4 marks)

18. Two balls are drawn one after another without replacement. Find the probability that both balls are red. (4 marks)

19. For the data 4, 7, 7, 9, 13, find the mean, the median, the mode and the range. (4 marks)

20. Find the standard deviation of the data above, correct to 3 significant figures. (4 marks)

Section F: Coordinate geometry

Question 6 (16 marks)

21. A(1, 2) and B(5, 10) are given. Find the length of AB in surd form, correct to 2 decimal places. (4 marks)

22. Find the slope of the line AB. (4 marks)

23. Find the equation of the perpendicular bisector of AB, giving the answer in general form. (4 marks)

24. The equation of a line L is $3x + 4y - 12 = 0$. Find the slope, the x-intercept and the y-intercept of L. (4 marks)