S2 Mathematics Practice Paper: Laws of Indices and Scientific Notation, Polynomial Expansion and Factorisation, Simultaneous Linear Equations, Ratio and Variation, Pythagoras Theorem, Statistics and Probability

S2 | Mathematics | Time: 75 minutes | Total: 100 marks | 24 questions

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Part 1: Laws of Indices and Scientific Notation

Evaluate the following. Show your steps and give exact or reasonable decimal answers.

1. Find the value of 2^5 x 2^-3. [4]

2. Given x = 2, find (3x^2)^3. [4]

3. Write 0.00045 in scientific notation, then multiply by 4 x 10^3. [4]

4. Find 6.4 x 10^5 / (3.2 x 10^2) and give the answer in scientific notation. [4]

Part 2: Polynomial Expansion and Factorisation

Show full working; factorise completely.

5. Expand (2x + 3)(x - 5) and evaluate it when x = 2. [4]

6. Expand (x + 4)^2 - (x - 4)^2 and evaluate it when x = 3. [4]

7. Factorise 12x^2 - 18x + 6 and check the result at x = 2. [5]

8. Factorise x^2 - 49 and 4x^2 - 20x + 25. [5]

Part 3: Simultaneous Linear Equations

Use substitution or elimination; state both unknowns.

9. Solve x + y = 12 and x - y = 4. [4]

10. Solve 2x + 3y = 19 and x - y = 2. [4]

11. A cage holds chickens and rabbits with 30 heads and 82 legs. Find the number of each. [4]

12. Solve 3x + 2y = 16 and 5x - 2y = 8. [4]

Part 4: Ratio and Variation

State the constant or ratio first, then find the answer; money is in dollars.

13. y varies directly as x, and y = 15 when x = 6. Find y when x = 10. [4]

14. y varies inversely as x, and y = 9 when x = 4. Find y when x = 3. [4]

15. Divide $4,800 among three people in the ratio 3 : 4 : 5. [4]

16. A map has a scale of 1 : 25,000 and two places are 6.4 cm apart on it. Find the real distance in km. [4]

Part 5: Pythagoras Theorem

Give non-integer answers to 1 decimal place and state the formula used.

17. A right-angled triangle has legs 9 cm and 12 cm. Find the hypotenuse. [4]

18. A right-angled triangle has hypotenuse 13 cm and one leg 5 cm. Find the other leg. [4]

19. Is a triangle with sides 7 cm, 24 cm and 25 cm right-angled? Explain. [4]

20. A 13 m ladder leans on a wall with its foot 5 m from the wall. If the foot slides to 6 m, how far does the top fall (1 d.p.)? [5]

Part 6: Statistics and Probability

Give probabilities as fractions and as decimals to 3 places; show the mean working.

21. For 12, 15, 15, 18, 20, 25 find the mean, median and mode. [4]

22. A bag holds 5 red, 3 blue and 2 green balls. One ball is drawn at random; find P(red) and P(not green). [4]

23. Three test scores are 70, 80 and 90 with weights 2 : 3 : 5. Find the weighted mean. [4]

24. Two fair dice are thrown. Find the probability that the total is 7 and that it is 12 (fraction and 3 d.p.). [5]
