



**13 Plus**

**Paper [ 5 ]**

**Maths Non-Calculator**

**Total marks: [ 60 ]**

**Time allowed: 60 minutes**

Instructions

- You have one hour
- Calculators are not allowed
- Show your working
- There are 60 marks available. If you get stuck on a question, go onto the next question and come back at the end.
- Use either pen or pencil and write your answers on the paper.

**Full name** \_\_\_\_\_

## Questions

1. a. Erin has 35 boxes of pink pens and 37 boxes of purple pens. Each box contains 12 pens. How many pens does Erin have in total? (2 marks)

b. Erin needs to separate them into piles of 32 pens for her classes. How many piles will she have in total? (2 marks)

2. a. What is the fourth cube number?

b. What is the 13<sup>th</sup> square number?

3. Are these rational or irrational numbers?

a. 24.5      b. the square root of 5      c. Pi

4. Jenny wants to find out if 117 is a prime number. How could she find this out? Give two methods. (2 marks)

5. Find the prime factorisation of 280. (2 marks)

6. Buses leave Cambridge bus station every 9 minutes to go to London and every 12 minutes to go to Oxford.

Two buses leave for London and Oxford at 11:25. What time will the next buses leave concurrently? (2 marks)

7. Round 132.45 to

a. Two significant figures

b. One decimal place

8. Simplify the following expressions

a.  $3^5 \times 3^8$

b.  $y^5 \div y^8$

9. Monty wants to write some numbers in standard form. Can you help him?

a. 0.00336

b. 459000

10. Simplify the following expressions:

a.  $5x + 3y - x + 2y$

b.  $(8x - 2)^2$

11. Factorise the following expressions (2 marks each):

a.  $12x^2 + 36x$

b.  $9d^2 - 3de$

12. Solve the following equations (2 marks each):

a.  $3(a - 1) = 2(a + 2)$

b.  $3b + 5 = b + 12$

13. a. Find an expression for the  $n$ th term of the sequence which begins 4, 9, 14, 19....

b. Is 68 a term in the sequence  $10n + 1$ ? Give a reason for your answer. (2 marks)

14. A and B have coordinates (1, 2) and (7, 8). Find the midpoint of the line AB. (2 marks)

15. Fill in the table for the graph of  $y = 3x + 2$  (2 marks)

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| X | 0 | 1 | 2 | 3 | 4 |
| y |   |   |   |   |   |

16. Alan has 100 books and Vera has 220 books. Write this as a ratio in its simplest form. (2 marks)

17. Write the ratio 2400ml to 3.6 litres in its simplest form. (2 marks)

18. A shirt increases in price by 35%. The original price was £16. What is the new price? (2 marks)

19. Estimate, using a conversion of 1 mile = 1.6km, how far 20 miles is in kilometres.



20. What is the name of a nine-sided shape?

21. Alan plays a game on his computer. He has 50 tries. The probability of him winning is 0.12. Estimate the number of times he will win the game. (3 marks)

22. Look at the following set of data and find the

- a. mean
- b. range
- c. mode
- d. median

13    5    13    17    13       11    8    9    4    7

23. Two angles in an isosceles triangle are  $46^\circ$  and  $67^\circ$ . What is the size of the other angle? You must show your working out. (2 marks)

24. A regular polygon has interior angles which each measure  $150^\circ$ . How many sides does it have? You must show your working. (3 marks)

25. A fair dice is rolled 300 times. How many times would you expect to roll a factor of 12? (2 marks)

**Answers**

1. a. 864      b. 27
2. a. 64      b. 169
3. a. rational    b. irrational    c. irrational
4. Prime numbers up to 120 cannot be divided by 3 OR 7; she could also try prime factorization.
5.  $2^3 \times 5 \times 7$
6. 1201
- 7.a. 130      b.132.5
8. a.  $3^{13}$       b.  $y^{13}$
- 9.a.  $3.36 \times 10^{-3}$       b.  $4.59 \times 10^5$
- 10.a.  $4x + 5y$       b.  $64x^2 - 32x + 4$
- 11.a.  $12x(x + 3)$       b.  $3d(3d - e)$
- 12.a.  $a = 7$       b.  $b = 3.5$
- 13.a.  $5n - 1$     b. No, because 69 does not divide by ten to give a whole number.
14. (4, 5)
- 15.

|   |   |   |   |    |    |
|---|---|---|---|----|----|
| X | 0 | 1 | 2 | 3  | 4  |
| y | 2 | 5 | 8 | 11 | 14 |

16. 5:11
17. 2:3
18. £21.60
19. 32km
20. Nonagon
21. He will win 6 times ( $0.12 \times 50$ )
- 22.a. 10      b. 13      c. 13      d. 10
23.  $67^\circ$
24. 12 sides.
25. 250 times.