SECTION A (45 marks)

Attempt all questions.   You should not spend more than 45 minutes on this section.
Answer each question by writing either (a), (b), (c), (d) in the box under each question number.
If you wish to change an answer, cross out your first choice and write your new answer
near the box.
This paper must be enclosed in your answer book.

1.   How many prime numbers are there between 30 and 40 ?

   (a)   none   (b)   2   (c)   1   (d)   5

2.   If $34_{\text{five}} = y_{\text{ten}}$, then y is

   (a)   23   (b)   19   (c)   7   (d)   45

3.   Of the following which is the best approximation for 4/7 ?

   (a)   1·75   (b)   5·7   (c)   0·57   (d)   4·7

4.   In a year when income tax is 35p in the £, a person with an annual salary of £1800 and
   tax free allowances of £1100 pays as income tax

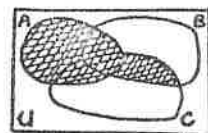   (a)   £630   (b)   £245   (c)   £385   (d)   £20

5.   A garage sold 720 vehicles.   90 of these were vans.   On a pie–chart the measure of the
   angle at the centre representing the number of vans sold is

   (a)   45°   (b)   180°   (c)   90°   (d)   80°

6.   The nth term of a sequence is $(n + 1)(2n + 1)$.
   The second term is

   (a)   8   (b)   6   (c)   2   (d)   15

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7. The cross-shaded region in the Venn diagram represents one of the following. Which one ?

(a) $A \cup (B \cup C)$ (b) $B' \cup C'$ (c) $A \cup (B \cap C)$ (d) $A \cap (B \cap C)$

8. One factor of $3x^2 + 5x - 12$ is $x + 3$. The other factor is

(a) $3x + 4$ (b) $4x + 3$ (c) $2x - 9$ (d) $3x - 4$

9. The value of $12x^8 \div 3x^2$ is

(a) $4x^{10}$ (b) $4x^6$ (c) $36x^{10}$ (d) $4x^4$

10. The domain of the function $f: \ x \rightarrow 3x + 2$ is $\{-1, 0, 1\}$.
Its range is

(a) $\{-1, 0, 1\}$ (b) $\{-1, 2, 5\}$ (c) $\{2\}$ (d) $\{1, 2, 5\}$

11. The perimeter of a rectangle is 20 cm. If the length of one of its sides is x cm, then its area in cm^2 is

(a) $x(20 - x)$ (b) $x(x - 20)$ (c) $x(x - 10)$ (d) $x(10 - x)$

12. When $x \neq 1$, $\dfrac{x^2 - 1}{x^2 - 2x + 1}$ is

(a) $\dfrac{x - 1}{x + 1}$ (b) $\dfrac{x + 1}{x - 1}$ (c) $\dfrac{1}{2x - 1}$ (d) $\dfrac{1}{2x}$

13. $(x - 2y)^2$ is

(a) $x^2 + 4y^2$ (b) $(x - 2y)(x + 2y)$ (c) $x^2 - 2xy + 4y^2$ (d) $x^2 - 4xy + 4y^2$.

14. The solution set of $x^2 = x$ is

(a) $\{0\}$ (b) $\{1\}$ (c) $\{0, 1\}$ (d) ϕ

15. $1 - 3x < 5 - x \Rightarrow$

(a) $x > -2$ (b) $x < -3$ (c) $x > 3$ (d) $x < -2$.

Attempt QUESTION 16 and THREE other questions

16. (a) Find the compound interest on £525 for 2 years at 8% per annum.

(12 marks)

(b) Using tables (page 20 to page 27), or otherwise, find correct to three significant figures, the value of

$$\frac{1}{a} - b^2 + \sqrt{c}, \text{ where } a = 5\cdot27, \ b = 2\cdot79, \ c = 347.$$

(13 marks)

17. (a) Find the solution set of the quadratic equation
$$2x^2 - x - 3 = 0.$$

(10 marks)

(b) Find the couple (x, y) which satisfies the simultaneous equations
$$x = 2y - 5$$
$$y = 2x + 1.$$

(10 marks)

18. (a) Factorise $x^2 - xy + 2x - 2y$.

(10 marks)

(b) Express the following word sentence as a number sentence:

If a certain number is multiplied by 3 and 12 is added to the product, the result is the same as if twice the number is subtracted from 2. Hence find the number.

(10 marks)

19. The mass of each of 22 articles was recorded in kilograms as:

15, 15, 17, 16, 18, 15, 15, 15, 16, 16, 18,
16, 15, 15, 16, 15, 18, 18, 15, 16, 15, 17.

Express the recordings as a frequency table.
What is the mode ? Calculate the mean.

(20 marks)

20. Find the set of couples of the function $x \rightarrow x^2 - 2x - 1$, where $x \in \{-2, -1, 0, 1, 2, 3\}$. Graph the function
$$f : x \rightarrow x^2 - 2x - 1 \text{ in the domain } -2 \leqslant x \leqslant 3, x \in R.$$
Use your graph to find (i) $f(1\frac{1}{2})$, (ii) the value of x for which $f(x) = 3$.

(25 marks)

21. (a) Solve: $3(2x - 3) - 2(2 - x) = 4 - 2(3x + 5)$.

(12 marks)

(b) Express as a single fraction $\dfrac{3}{5x - 2} - \dfrac{3}{5x + 2}$ and verify your answer by putting $x = 1$.

(13 marks)

22. Illustrate the following problem by a Venn diagram:

In a class of 29 pupils, U is the set of all pupils in the class. A is the set of pupils over 16 years of age. B is the set of pupils who wear glasses. C is the set of pupils who live more than 2 km from the school.

$\#(A) = 13$, $\#(B) = 14$, $\#(C) = 16$, $\#(A \cap B) = 5$, $\#(B \cap C) = 7$, $\#(A \cap B \cap C) = 2$.

Describe the pupils in the set A\(B $\cup$ C).
Calculate $\#(A\backslash(B \cup C))$.
How many pupils under 16 do not wear glasses ?

(30 marks)