

Name: _____

Class: _____

IGCSE Mathematics 0580 — National Day Holiday Assignment

Instructions: Answer all questions. Show all working. Calculators may be used where appropriate.

Part A: Number (Questions 1–10)

Question 1 (2 marks)

From the list of numbers below, write down:

-7 , 0 , $\sqrt{9}$, $\frac{3}{4}$, π , $\sqrt{2}$, 15 , -2.5 , $\sqrt[3]{27}$

- (a) a natural number
- (b) an irrational number
- (c) a negative integer
- (d) a rational number that is not an integer

[_____]

[_____]

Question 2 (2 marks)

Find the Highest Common Factor (HCF) and the Lowest Common Multiple (LCM) of 24 and 36.

[_____]

[_____]

Question 3 (3 marks)

The Venn diagram shows two sets A and B where $\xi = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$.

- $A = \{2, 4, 6, 8, 10\}$
- $B = \{3, 6, 9\}$

- (a) List the elements of $A \cap B$.
- (b) List the elements of $A \cup B$.
- (c) Find $n(A')$.

[_____]
 [_____]

Question 4 (2 marks)

Write the following numbers in order of size, starting with the smallest:

$$0.65, \quad \frac{2}{3}, \quad 64\%, \quad \frac{13}{20}$$

[_____]
 [_____]

Question 5 (3 marks)

Calculate, showing all your working:

(a) $\frac{3}{4} + \frac{5}{6}$

(b) $\frac{7}{8} \div \frac{21}{16}$

(c) $-5 + 3 \times (-4) - (-2)$

[_____]
 [_____]
 [_____]

Question 6 (3 marks)

Simplify, leaving your answers in index form:

(a) $5^7 \times 5^{-3}$

(b) $\frac{(2^3)^4}{2^5}$

(c) $16^{\frac{1}{2}} \times 27^{\frac{1}{3}}$

[_____]
 [_____]
 [_____]

Question 7 (3 marks)

(a) Write 0.000 047 2 in standard form.

(b) Calculate $\frac{3.6 \times 10^5}{4.8 \times 10^{-2}}$, giving your answer in standard form.

[_____]

[_____]

Question 8 (4 marks)

A car travels at a constant speed of 72 km/h.

- (a) Convert this speed to metres per second.
- (b) How long, in minutes and seconds, does the car take to travel 1.8 km?

[_____]

[_____]

[_____]

Question 9 (4 marks)

A sum of \$2500 is invested at a compound interest rate of 4% per year.

- (a) Calculate the total amount after 3 years. Give your answer correct to 2 decimal places.
- (b) Find the number of complete years it takes for the investment to exceed \$3000.

[_____]

[_____]

[_____]

Question 10 (5 marks)

(Challenge)

A rectangular field has length $l = 48$ m and width $w = 32$ m, both measured to the nearest metre.

- (a) Write down the upper and lower bounds of the length l .
- (b) Calculate the upper bound of the area of the field.
- (c) Simplify $\sqrt{50} + \sqrt{18} - \sqrt{8}$, leaving your answer in the form $k\sqrt{2}$ where k is an integer.
- (d) Rationalise the denominator of $\frac{6}{\sqrt{3}}$.

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[_____]

[_____]

[_____]

Part B: Algebra and Graphs (Questions 11–20)

Question 11 (2 marks)

Given that $a = 3$, $b = -2$, and $c = 5$, evaluate:

(a) $2a^2 - bc$

(b) $\frac{a+c}{b}$

[_____]

[_____]

Question 12 (2 marks)

Expand and simplify:

(a) $4(2x - 3) - 3(x + 5)$

(b) $(x + 4)(x - 7)$

[_____]

[_____]

Question 13 (3 marks)

Factorise completely:

(a) $6x^2 + 9x$

(b) $x^2 - 49$

(c) $x^2 + 10x + 25$

[_____]

[_____]

[_____]

Question 14 (3 marks)

Simplify:

(a) $\frac{x^2 - 9}{x + 3}$

(b) $\frac{2x + 6}{4x + 12}$

(c) $\frac{3}{x} + \frac{2}{x + 1}$

[_____]

[_____]

[_____]

Question 15 (3 marks)

Solve for x :

(a) $2^{3x} = 32$

(b) $5^{x+1} = 25^{x-1}$

(c) $9^x = \frac{1}{3}$

[_____]

[_____]

[_____]

Question 16 (4 marks)

(a) Expand $(2x - 3)^2$.

(b) Factorise $2x^2 + 7x - 15$.

(c) Hence solve $2x^2 + 7x - 15 = 0$.

[_____]

[_____]

[_____]

Question 17 (4 marks)

(a) Factorise $3x^3 - 12x$.

(b) Simplify $\frac{x^2 + 5x + 6}{x^2 - 4}$.

(c) Given that $y = \frac{x^2 + 5x + 6}{x^2 - 4}$, find the value of y when $x = 5$.

[_____]

[_____]

[_____]

Question 18 (4 marks)

(a) Write $x^2 - 6x + 11$ in the form $(x - p)^2 + q$.

(b) Hence state the minimum value of $x^2 - 6x + 11$ and the value of x at which it occurs.

[_____]

[_____]

[_____]

Question 19 (5 marks)

(Challenge)

- (a) Simplify $\frac{2x^2 - 8}{x^2 + 3x - 10}$.
- (b) Solve $4^{2x-1} = 8^{x+2}$.
- (c) Given that $\frac{x+3}{x-1} = \frac{5}{2}$, find the value of x .

[_____]

[_____]

[_____]

[_____]

Question 20 (5 marks)

(Challenge)

- (a) Factorise completely $2x^3 - 8x^2 + 6x$.
- (b) Hence solve $2x^3 - 8x^2 + 6x = 0$.
- (c) Simplify $\frac{4}{\sqrt{5}-1}$ by rationalising the denominator.

[_____]

[_____]

[_____]

[_____]

