

Mid Year Examination Paper 2

INSTRUCTION TO CANDIDATES:

1. Answer **all** questions.
2. Write your answers and working in the spaces provided.
3. Omission of essential working will result in loss of marks.
4. Calculators may be used in this paper.
5. If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer correct to three significant figures. Give answers in degrees correct to one decimal place.

Marks Obtained
50

- 1 (a) Evaluate $\frac{4\frac{1}{2} - 1\frac{3}{7}}{4\frac{3}{28}}$, giving your answer as a fraction.
- (b) If $x : y = 4 : 3$ and $y : z = 6 : 11$, find the ratio of $x : y : z$.
- (c) Given that $3x - 4y = 0$, find the value of $\frac{x}{y}$.

Ans: (a) _____ [1]

(b) _____ [2]

(c) _____ [2]

- 2 (a) Factorise $ac + bc$.
- (b) Use your answer in (a) to evaluate $72 \times 45 + 28 \times 45$, without using a calculator.

Ans: (a) _____ [1]

(b) _____ [2]

- 3** In a swimming competition, the timings of three swimmers in a 50-metre freestyle and a 100-metre freestyle are given in the table below.

Swimmer	50 metres timing (seconds)	100 metres timing (seconds)
Chandra	32	75
Chan Ming	29	?
Charlie	32	70

- (a) What was Chandra's average speed, in m/s, for the 50 m sprint?
 (b) What is the ratio of Chandra's 100 m timing to Charlie's 100 m timing?
 (c) Given that Chan Ming swam at the same average speed for both the 50-metre swim and the 100-metre swim, what is his timing for the 100-metre swim?

Ans: (a) _____ m/s [1]

(b) _____ : _____ [1]

(c) _____ s [1]

- 4** A fruit grocer has three different types of fruits. There are 84 apples, 60 oranges and 72 guavas. The fruits are mixed into packets with equal number of each type of fruit per packet.

- (a) Find the maximum number of packets he can have.
 (b) How many apples are there in each packet?
 (c) If each packet is sold at \$6.50, how much will he receive if he sold all the packets of fruits?

Ans: (a) _____ [2]

(b) _____ [1]

(c) \$ _____ [1]

- 5** A farmer was able to plant 60 seedlings in a plot of land measuring 3 m by 5 m.
- (a) Calculate the average number of seedlings planted per square metre.
 - (b) How many seedlings can be planted in a square plot of land with length 24 metres?

Ans: (a) _____ seedlings / m² [2]

(b) _____ seedlings [2]

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- 6** Solve the following equations.

(a) $2x + 7 = \frac{2}{3}x - 9$

Ans: (a) $x =$ _____ [2]

(b) $\frac{3}{x-5} = \frac{6}{x-2}$

Ans: (b) $x =$ _____ [3]

- 7** (a) Evaluate $\sqrt{2025}$ using prime factorisation.

Ans: (a) _____ [2]

- (b) Find the smallest k such that $2025k$ is a multiple of 6.

Ans: (b) $k =$ _____ [2]

- (c) Find the smallest value of x , given that the LCM of $2^8 \times 7^x$ and $2^7 \times 7^2$ is $2^8 \times 7^2$.

Ans: (c) $x =$ _____ [1]

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- 8** James's pocket money is \$4 per day for x days. Within the x days, he spent \$2.50 per day for the first 7 days and then spent \$3 per day for the remaining days. He saved the rest of the money.
- (a) Find the total amount he spent in terms of x during the x days. Simplify your answer.
- (b) Given that he saves \$23.50, form an equation in terms of x and calculate the total pocket money he receives altogether.

Ans: (a) \$ _____ [2]

(b) \$ _____ [3]

- 9 The diagram below shows different types of diamonds ‘cuts’. The more cuts the diamond has, the better the quality of the diamond.

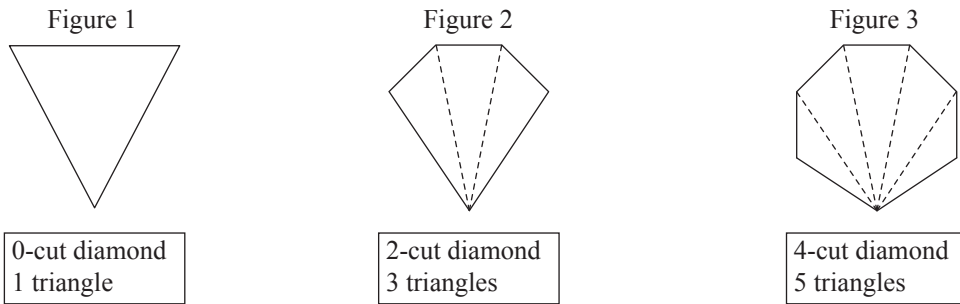


Figure	1	2	3	4	...	n
Number of cuts	0	2	4	d	...	C_n
Number of triangles	1	3	5	t	...	T_n

- (a) Find the value of d and the value of t .
- (b) Find the number of triangles present for Figure 8.
- (c) Write down an expression, in terms of n , for
- (i) the number of diamond ‘cuts’, C_n , in Fig n ,
 - (ii) the number of triangles, T_n , in Fig n .

Ans: (a) $d =$ _____, $t =$ _____ [2]

(b) _____ [1]

(c) (i) $C_n =$ _____ [1]

(ii) $T_n =$ _____ [1]

10 Simplify the following expressions.

(a) $3y - [3 - 2(y - 3)]$

Ans: (a) _____ [2]

(b) $\frac{3k}{2} - \frac{k+2}{3}$

Ans: (b) _____ [3]

11 (a) Let x be an even number.

(i) Express the next two even numbers in terms of x .

(ii) Express the sum of the three even numbers in terms of x .

Ans: (a) (i) _____ [1]

(ii) _____ [1]

(b) Peter received $\$(x + 2y - 4)$ and George received $\$(3x - y + 6)$. Given that George receives more than Peter, express the difference in the amount they receive in terms of x and y .

Ans: (b) \$ _____ [2]

(c) Solve the inequality $-3x \leq 12$, and express your answer on a number line.

Ans: (c) _____ [2]

Solutions to:

Mid Year Examination Paper 2

1. (a) $\frac{4\frac{1}{2} - 1\frac{3}{7}}{4\frac{3}{28}} = \frac{3\frac{1}{14}}{4\frac{3}{28}}$
 $= \frac{86}{115}$

(b) $x : y = 4 : 3$
 $= 8 : 6$

Since y is the same quantity (i.e. 6)

$\therefore x : y : z = 8 : 6 : 11$

(c) $3x - 4y = 0$
 $3x = 4y$
 $\frac{x}{y} = \frac{4}{3}$

2. (a) $ac + bc = c(a + b)$

(b) Let $a = 72$, $b = 28$ and $c = 45$
 $72 \times 45 + 28 \times 45 = 45(72 + 28)$
 $= 45(100)$
 $= 4500$

3. (a) Average speed $= \frac{50 \text{ m}}{32 \text{ s}}$
 $= 1.5625 \text{ m/s}$

(b) Ratio $= 75 : 70$
 $= 15 : 14$

(c) Since his average speed is the same,
 Timing for 100-metre swim $= 2 \times 29 \text{ s}$
 $= 58 \text{ s}$

4. (a) $\text{HCF}(84, 60, 72) = 2^2 \times 3$
 $= 12$

2	84, 60, 72
2	42, 30, 36
3	21, 15, 18
	7, 5, 6

He can have a maximum of 12 packets.

(b) Number of apples per packet $= 84 \div 12$
 $= 7$

(c) Total amount received $= 12 \times \$6.50$
 $= \$78$

5. (a) Total area of land $= 3 \times 5$
 $= 15 \text{ m}^2$
 Average number of seedlings $= 60 \div 15$
 $= 4 \text{ seedlings/m}^2$

(b) Area of square plot $= 24 \times 24$
 $= 576 \text{ m}^2$
 Number of seedlings $= 576 \div 4$
 $= 144$

6. (a) $2x + 7 = \frac{2}{3}x - 9$
 $2x - \frac{2}{3}x = -9 - 7$
 $1\frac{1}{3}x = -16$
 $x = -12$

(b) $\frac{3}{x-5} = \frac{6}{x-2}$
 $3(x-2) = 6(x-5)$
 $3x - 6 = 6x - 30$
 $-6 + 30 = 6x - 3x$
 $24 = 3x$
 $x = 8$

cross-multiply

7. (a)

5	2025
5	405
3	81
3	27
3	9
3	3
	1

$2025 = 3^4 \times 5^2$

$\therefore \sqrt{2025} = \sqrt{3^4 \times 5^2}$
 $= 3^2 \times 5$
 $= 45$

(b) $6 = 2 \times 3$

Since 6 has a factor 2 which is not a factor of 2025, $k = 2$.

(c) $2^8 \times 7^x$
 $2^7 \times 7^2$
 $\text{LCM} = 2^8 \times 7^2$

Since the LCM is obtained by finding the highest power of each factor, x can be 0, 1 or 2.

\therefore smallest value of $x = 0$.

8. (a) Total amount spent $= 7 \times \$2.50 + (x - 7) \times \3
 $= 17.50 + 3x - 21$
 $= \$(3x - 3.5)$

(b) Total pocket money $= \$4x$
 Total amount saved $= \$4x - \$(3x - 3.5)$
 $= \$(x + 3.5)$

Hence, $x + 3.5 = 23.5$
 $x = 23.5 - 3.5$
 $= 20$

Total pocket money $= \$4 \times 20$
 $= \$80$

9. (a) $d = 6$
 $t = 7$

(b) 15 triangles

(c) (i) Using the formula $C_n = C_1 + (n - 1)d$ where
 First term, $C_1 = 0$
 Common difference, $d = 2$
 $C_n = 0 + (n - 1)(2)$
 $C_n = 2n - 2$

(ii) Using the formula $T_n = T_1 + (n - 1)d$ where

$$\text{First term, } T_1 = 1$$

$$\text{Common difference, } d = 2$$

$$T_n = 1 + (n - 1)(2)$$

$$T_n = 2n - 1$$

10. (a) $3y - [3 - 2(y - 3)] = 3y - [3 - 2y + 6]$
 $= 3y - (9 - 2y)$
 $= 3y - 9 + 2y$
 $= 5y - 9$

(b) $\frac{3k}{2} - \frac{k+2}{3} = \frac{9k}{6} - \frac{2(k+2)}{6}$
 $= \frac{9k - 2(k+2)}{6}$
 $= \frac{9k - 2k - 4}{6}$
 $= \frac{7k - 4}{6}$

11. (a) (i) $x + 2$ and $x + 4$

(ii) $\text{Sum} = x + (x + 2) + (x + 4)$
 $= 3x + 6$

(b) $\text{Difference} = (3x - y + 6) - (x + 2y - 4)$
 $= 3x - y + 6 - x - 2y + 4$
 $= 2x - 3y + 10$

(c) $-3x \leq 12$

$$x \geq 12 \div (-3)$$

reverse inequality sign

$$x \geq -4$$

