

# Mid Year Examination Paper 1

## 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** From the following list of numbers given, write down

$$-5, \sqrt{2}, \pi, \frac{2}{5}, \sqrt{36}, 0.\dot{1}\dot{6}$$

- (a) two numbers that are **integers**,
- (b) two numbers that are **irrational numbers**.

*Ans:* (a) \_\_\_\_\_, \_\_\_\_\_ [2]

(b) \_\_\_\_\_, \_\_\_\_\_ [2]

- 2** Arrange the following numbers in descending order:

$$\frac{2}{7}, -3.5, -3, 0$$

*Ans:* \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ [2]

- 3** Express, correct to 2 significant figures,

- (a) 668.78,
- (b) 0.01965.

*Ans:* (a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [1]

- 4 Find the HCF and LCM of the two numbers  $2^4 \times 11^6 \times 19^5$  and  $2^2 \times 11^3 \times 17^4$ , giving your answer in **index notation**.

*Ans:* HCF = \_\_\_\_\_ [1]

LCM = \_\_\_\_\_ [1]

- 5 (a) Given that  $2205 = 3^x \times 5^y \times 7^z$ , find the values of  $x$ ,  $y$  and  $z$ .  
(b) Given that  $2205k$  is a perfect square, find the smallest integer value of  $k$ .

*Ans:* (a)  $x =$  \_\_\_\_\_,  $y =$  \_\_\_\_\_,  $z =$  \_\_\_\_\_ [3]

(b)  $k =$  \_\_\_\_\_ [1]

- 6 In a particular club, the ratio of the number of boys to girls was 9 : 5. After 2 boys left the club, the ratio became 5 : 3. Find the original number of girls in the club.

*Ans:* \_\_\_\_\_ girls [3]

- 7** City *A* and City *B* are 330 km apart. A man drove from City *A* to City *B* at an average speed of 90 km/h.
- (a) Find the average speed in m/s.  
(b) Calculate the travelling time **in hours and minutes**.

*Ans:* (a) \_\_\_\_\_ m/s [1]

(b) \_\_\_\_\_ hours \_\_\_\_\_ minutes [2]

- 8** (a) Simplify  $3(x - 4) - (7 - x)$ .  
(b) Subtract  $7x - 2y + z$  from  $3x + 9y + 2z$ .

*Ans:* (a) \_\_\_\_\_ [2]

(b) \_\_\_\_\_ [2]

- 9** Write down the next two terms of the following number sequences.

(a) -4, -1, 2, 5, \_\_\_\_\_, \_\_\_\_\_

(b) 1, 4, 9, 16, \_\_\_\_\_, \_\_\_\_\_

*Ans:* (a) \_\_\_\_\_, \_\_\_\_\_ [1]

(b) \_\_\_\_\_, \_\_\_\_\_ [1]

**10** Solve the following equations.

(a)  $x = 6 + \frac{3}{4}x$ ,

(b)  $\frac{p-6}{3} = \frac{p}{7}$ .

*Ans:* (a)  $x =$  \_\_\_\_\_ [2]

(b)  $p =$  \_\_\_\_\_ [3]

**11** Sam bought 3 books at \$ $p$  each, 2 bags at \$ $q$  each and has \$( $5p - q$ ) left.

(a) How much did Sam spend?

(b) How much did Sam have at first?

*Ans:* (a) \$ \_\_\_\_\_ [1]

(b) \$ \_\_\_\_\_ [2]

**12** Factorise the following expressions.

(a)  $6ap - 4p^2 + 8p$ ,

(b)  $7(x - 2y) + 3x(x - 2y)$ .

*Ans:* (a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [1]

- 13** (a) Evaluate  $\frac{\sqrt{95} - 3^2}{65 - 2.3}$  and round off the answer to 3 significant figures.  
(b) Given that a piece of string is 200 cm long after being rounded off to 1 significant figure. Write the smallest possible length.

*Ans:* (a) \_\_\_\_\_ [2]

(b) \_\_\_\_\_ cm [1]

- 14** The parking charges for a car park is as follows:

- \$1.50 for the first hour
- 2 cents for every subsequent minute

How much is a driver charged if he parks for  $2\frac{1}{2}$  h?

*Ans:* \$ \_\_\_\_\_ [2]

- 15** Tom's father is 21 years older than Tom. In three years' time, Tom's father will be thrice as old as Tom then. What is Tom's age now?

*Ans:* \_\_\_\_\_ years old [3]

**16** Given that  $v = 26$ ,  $u = -7$  and  $t = 3$ , find the value of  $a$  in the formula  $a = \frac{v-u}{t}$ .

*Ans:*  $a =$  \_\_\_\_\_ [2]

- 17** (a) By solving the inequality  $7x \leq 130$ , find the largest possible prime value of  $x$ .  
(b) A projector costs \$2300. Find the maximum number of projectors that can be bought with \$26 000.

*Ans:* (a)  $x =$  \_\_\_\_\_ [2]

(b) \_\_\_\_\_ [2]

**Solutions to:**

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1. (a)  $-5, \sqrt{36}$

(b)  $\sqrt{2}, \pi$

2.  $\frac{2}{7}, 0, -3, -3.5$

3. (a) 670

(b) 0.020

4. 
$$\frac{2^4 \times 11^6 \times 19^5}{2^2 \times 11^3 \times 17^4}$$

HCF =  $2^2 \times 11^3$

LCM =  $2^4 \times 11^6 \times 17^4 \times 19^5$

5. (a) 

3	2205
3	735
5	245
7	49
7	7
	1

$\therefore 2205 = 3^2 \times 5^1 \times 7^2$

$x = 2, y = 1, z = 2$

(b) For  $2205k$  to be a perfect square, all the powers of the factors need to be even.

$\therefore k = 5$

6. Let the number of boys and girls be  $9x$  and  $5x$  respectively.

$\frac{9x-2}{5x} = \frac{5}{3}$

$5(5x) = 3(9x-2)$

$25x = 27x - 6$

$6 = 2x$

$x = 3$

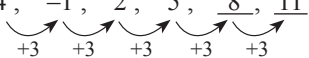
Original number of girls =  $5x$   
 $= 5(3)$   
 $= 15$

7. (a)  $90 \text{ km/h} = \frac{90 \text{ km}}{1 \text{ h}}$   
 $= \frac{90\,000 \text{ m}}{3600 \text{ s}}$   
 $= 25 \text{ m/s}$

(b) Time taken =  $\frac{330 \text{ km}}{90 \text{ km/h}}$   
 $= 3\frac{2}{3} \text{ h}$   
 $= 3 \text{ h } 40 \text{ min}$

8. (a)  $3(x-4) - (7-x) = 3x - 12 - 7 + x$   
 $= 4x - 19$

(b)  $3x + 9y + 2z - (7x - 2y + z)$   
 $= 3x + 9y + 2z - 7x + 2y - z$   
 $= -4x + 11y + z$

9. (a)  $-4, -1, 2, 5, 8, 11$   


(b)  $1, 4, 9, 16, 25, 36$   
 $(1^2) (2^2) (3^2) (4^2) (5^2) (6^2)$

10. (a)  $x = 6 + \frac{3}{4}x$   
 $x - \frac{3}{4}x = 6$

$\frac{1}{4}x = 6$

$x = 24$

$(1 - \frac{3}{4})x = 6$

(b)  $\frac{p-6}{3} = \frac{p}{7}$

cross-multiply

$7(p-6) = 3p$

$7p - 42 = 3p$

$7p - 3p = 42$

$4p = 42$

$p = 10.5$

11. (a)  $\$(3p + 2q)$

(b) Amount Sam had at first =  $3p + 2q + (5p - q)$   
 $= \$(8p + q)$

12. (a)  $6ap - 4p^2 + 8p = 2p(3a - 2p + 4)$

(b)  $7(x-2y) + 3x(x-2y) = (x-2y)(7+3x)$

13. (a)  $\frac{\sqrt{95} - 3^2}{65 - 2.3} \approx 0.0119105$   
 $= 0.0119$  (3 s.f.)

(b) 150 cm

14.  $2\frac{1}{2} \text{ h} - 1 \text{ h} = 1\frac{1}{2} \text{ h}$   
 $= 90 \text{ min}$

Total charges =  $\$1.50 + (90 \times 2\text{¢})$   
 $= \$1.50 + 180\text{¢}$   
 $= \$1.50 + \$1.80$   
 $= \$3.30$

15. Let Tom's current age be  $x$  years.

$\therefore$  Tom's father's age is  $(x + 21)$  years now.

In three years' time,

$(x + 21) + 3 = 3(x + 3)$

$x + 24 = 3x + 9$

$15 = 2x$

$x = 7.5$

Tom is  $7\frac{1}{2}$  years old now.

16. Substituting  $v = 26$ ,  $u = -7$  and  $t = 3$  into  $a = \frac{v-u}{t}$

$a = \frac{26 - (-7)}{3}$   
 $= \frac{33}{3}$   
 $= 11$

17. (a)  $7x \leq 130$

$$x \leq \frac{130}{7}$$

$$\therefore x \leq 18\frac{4}{7}$$

Largest prime = 17

(b) Let the number of projectors bought be  $x$ .

$$2300x \leq 26\,000$$

$$x \leq \frac{26\,000}{2300}$$

$$\therefore x \leq 11\frac{7}{23}$$

The maximum number of projectors that can be bought is 11.