



# MILITARY TECHNOLOGICAL COLLEGE

ACADEMIC YEAR

GENERAL FOUNDATION PROGRAMME

SAMPLE EXAMINATION PAPER

Module Name & Code	GFP Basic Mathematics - MTCG1016	
ID Number	Duration of Exam	Exam Seat number
	90 Minutes	

### Instructions:

- Write the information required on the front page. Use blue / black ink or ball-point pen.
  - Students should not keep any helping / study materials with them. Copying, cheating and any kind of malpractice in the examination are strictly prohibited.
  - Use of only non- programmable calculators is allowed.
  - Answer the questions in the space provided. Extra sheets will not be allowed or provided.
  - All necessary solutions should be shown completely in Section B and Section C, otherwise marks for method will be lost.
  - The figures shown, if any, are only for illustration.
  - **Do not open** this question paper until the invigilator has told you to do so.
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<b>MARK DISTRIBUTION</b>			
Section	No. of Questions × Marks per Question = Total Marks Allocated	1 <sup>st</sup> Marking	2 <sup>nd</sup> Marking
A	$10 \times 2 = 20$ Marks		
B	$6 \times 2 = 12$ Marks		
C	$6 \times 3 = 18$ Marks		
Total = 50 Marks		/50	/50
Final Marks		/50	
Final Marks in %			

1<sup>st</sup> Marker

2<sup>nd</sup> Marker

Name and Signature

Name and Signature

## Section A

**Part-I: Answer the following 20 questions. Each question carries 1 mark.**

**[Total Marks 20]**

**Circle the correct answer of the following questions**



**1.** The percentage of 8 out of 32 is .....

- a) 25%
- b) 75%
- c) 66%

**2.** If  $-2x > 8$ , then .....

- a)  $x > -4$
- b)  $x < -4$
- c)  $x = -4$

**3.** If  $\frac{x}{10} = \frac{2}{5}$ , then  $x = \dots\dots\dots$

- a) 5
- b) 4
- c) 10

**4.** The inequality notation for  $(-1, 0]$  is

- a)  $-1 \leq x \leq 0$
- b)  $-1 \leq x < 0$
- c)  $-1 < x \leq 0$

**5.** Which property is shown by  $a \times b = b \times a$  ?

- a) Distributive
- b) Commutative
- c) Associative

6. If  $\sqrt{x} = 7$ , then  $x = \dots\dots$

- a) 49
- b) 7
- c)  $\sqrt{7}$

7. The value for ' $a$ ' in  $v = u + at$  is.....

- a)  $a = \frac{u-v}{t}$
- b)  $a = \frac{v+u}{t}$
- c)  $a = \frac{v-u}{t}$

8. Which number is an odd number?

- a) 1
- b) 22
- c) e

9. The two consecutive numbers are .....

- a) 51, 41
- b) 24, 25
- c) 10, 14

10. If 8 is added to 4 times a number, the result is 28 then the number is .....

- a) 11
- b) 5
- c) 12

11. 5600 metres = \_\_\_\_km

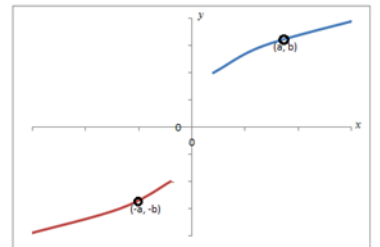
- a) 56
- b) 0.56
- c) 5.6

12. 2.64 megavolts = \_\_\_\_kilovolts

- a) 2640
- b) 0.00264
- c) 26400

13. The following graph is symmetric about the ....

- a)  $x$ -axis
- b)  $y$ -axis
- c) Origin



14. The measure of straight angle is ....

- a)  $90^\circ$
- b)  $180^\circ$
- c)  $360^\circ$

15.  $\frac{\pi}{3}$  rad = \_\_\_\_\_ $^\circ$  (degrees)

- a)  $30^\circ$
- b)  $270^\circ$
- c)  $60^\circ$

16. If  $\sec x = \frac{3}{2}$ , then  $\cos x = \dots$

a)  $\frac{2}{3}$

b)  $\frac{5}{2}$

c)  $\frac{5}{3}$

17. The amplitude of the curve  $y = -2\sin 3\pi x$  is...

a)  $\pi$

b) 2

c) -2

18. The  $x$ -intercept of the line  $y = 2x + 8$  is...

a) 10

b) 8

c) -4

19. The center of the circle  $(x - 2)^2 + (y + 2)^2 = 25$  is...

a)  $(2, -2)$

b) 5

c)  $(-2, 2)$

20. The curve which is symmetric about the  $y$ -axis is ...

a)  $y = x^2 - 1$

b)  $x = y^2 - 1$

c)  $y = 2x + 3$

## Section B

Answer the following 6 questions. Show your solution step by step.

Each question carries 2 marks

[Total Marks 12]

1. Find the LCM of 4, 6 and 8

[2 Marks]

2. Simplify  $2 \times 12 \div 6 - 3^2$

[2 Marks]

3. Simplify  $\frac{6^{2n} \times 6}{6^n \times 6^n}$

[2 Marks]

4. If  $A = \{0, 1, 2, 9, 10\}$  and  $B = \{5, 6, 7, 8\}$  then find

[2 Marks]

(a)  $A \cup B$

(b)  $A \cap B$

5. Perform the indicated operation and simplify

[2 Marks]

$$(5x^2 - 1)(3x^2 + 2)$$

6. Rationalize the denominator and simplify the fraction.

[2 Marks]

$$\frac{2}{\sqrt{5} - \sqrt{3}}$$

**Section C**

**Answer the following 6 questions. Show your solution step by step.**

**Each question carries 3 marks**

**[Total Marks 18]**

1. Solve the following simultaneous equations:

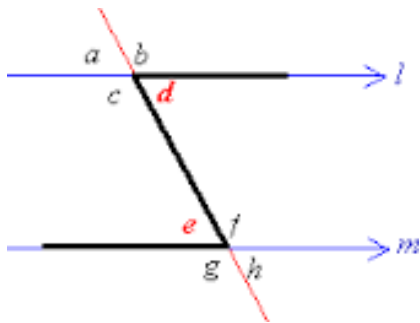
**[3 Marks]**

$$x + 2y = 3$$

$$3x - 2y = 1$$

2(a). Find angle  $c$  from the following figure if angle  $d = 75^\circ$

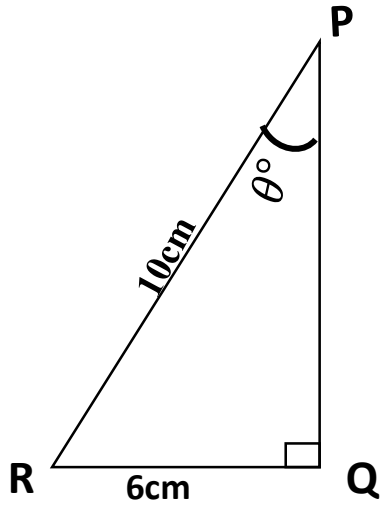
**[1 Mark]**



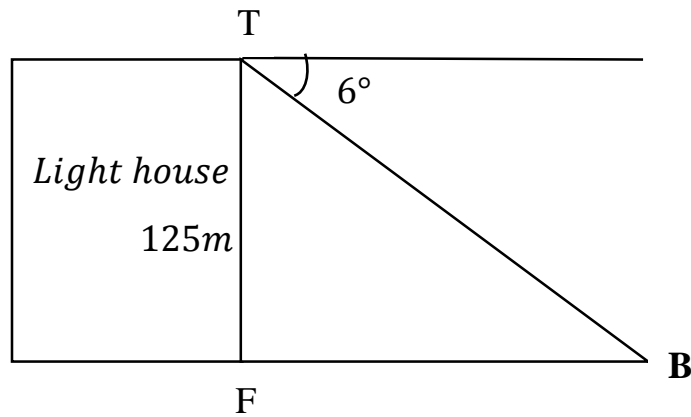


2(b). Find the angle  $\theta^\circ$  from the following figure.  
(Write final answer up to two decimal places)

[2 Marks]



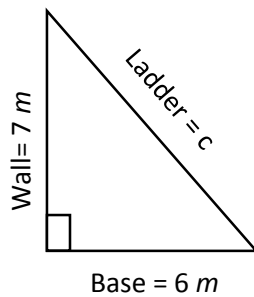
3(a). Find the distance of a boat B from the foot of the lighthouse if the lighthouse is 125 metres tall, and the angle of depression is  $6^\circ$ . [2 Marks]



3(b). Solve  $2x - 10 = 0$

[1 Mark]

4(a). A firefighter places the ladder against the side of a  $7m$  house. If the base of the ladder is  $6m$  away from the house, how long is the ladder? [2 Marks]



4(b).  $0 K = \underline{\hspace{1cm}} ^\circ C$

[1 Mark]

5. A line passes through (2, 10) and is parallel to the line  $y = 3x + 2$ .  
Find the equation of the line.

**[3 Marks]**

6. Perform the indicated operations and reduce the answer to its lowest terms.

$$\frac{1}{(x+2)^2} - \frac{1}{x^2-4}$$

**[3 Marks]**

**End of Examination**

## Formula Sheet- GFP-Basic Maths

### 1. Conversions

$$1 \text{ inch} = 2.54 \text{ cm}$$

$$1 \text{ metre} = 39.37 \text{ inches}$$

$$1 \text{ mile} = 1.609 \text{ km}$$

$$1 \text{ ton} = 1000 \text{ kg}$$

$$1 \text{ kg} = 2.2 \text{ pounds}$$

$$1 \text{ ounce} = 0.0625 \text{ pounds}$$

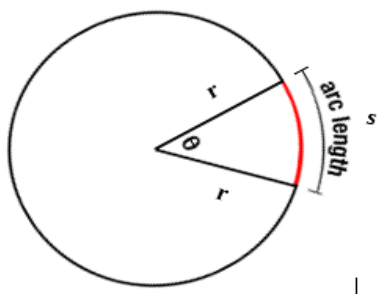
$$1 \text{ litre} = 1000 \text{ cm}^3$$

$$1 \text{ imperial gallon} = 4.55 \text{ litres}$$

$$K = ^\circ C + 273.15$$

$$^\circ F = 1.8 ^\circ C + 32$$

### 2. Sector

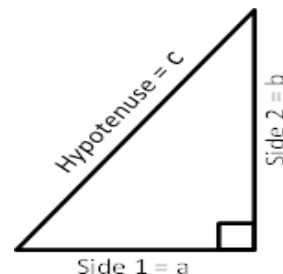


- **Angle in radians**( $\theta$ ) = 
$$\frac{\text{Length of Arc } (S)}{\text{Radius of Circle } (r)}$$
- **$\pi \text{ rad} = 180^\circ$**

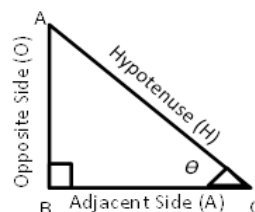
### 3. Pythagoras theorem

$$(\text{Side1})^2 + (\text{Side2})^2 = (\text{Hypotenuse})^2$$

or  $a^2 + b^2 = c^2$



### 4. Trigonometry



$$\sin \theta = \sin C = \frac{AB}{AC} = \frac{O}{H}$$

$$\cos \theta = \cos C = \frac{BC}{AC} = \frac{A}{H}$$

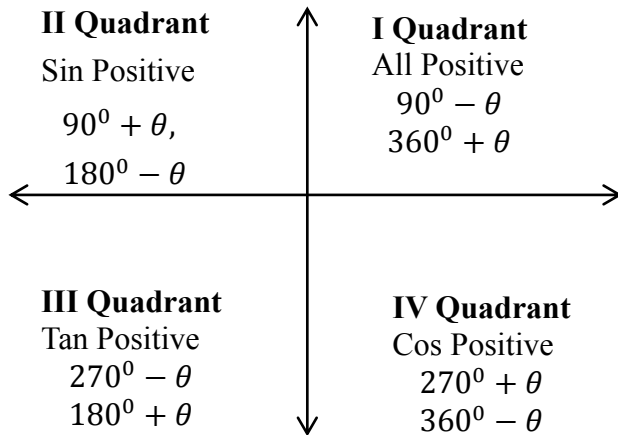
$$\tan \theta = \tan C = \frac{AB}{BC} = \frac{O}{A}$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}$$

## 5. Quadrant System



For  $y = a \sin bx$  and  $y = a \cos bx$

- Amplitude =  $|a|$
- No of Cycles from  $0^\circ$  to  $360^\circ = |b|$
- Period =  $\frac{2 \times 180^\circ}{b} = \frac{360^\circ}{b}$

## 6. Straight line

- General equation of the straight line is

$Ax + By = C$ , where A, B and C are constants (with A and B not both zero) & x and y are variables.

- Slope-intercept form of the straight line can also be written as  $y = mx + c$  where,

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \text{slope or gradient of the}$$

line

and c = y-intercept

- Equation of straight line passing through  $(x_1, y_1)$  and slope  $m$  is  
 $y - y_1 = m(x - x_1)$

## 7. Quadratic Equation

Solution of  $ax^2 + bx + c = 0$  is given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

## 8. Circle

Equation of circle with center  $C(h, k)$  and radius  $r$ , where  $r > 0$  is

$$(x - h)^2 + (y - k)^2 = r^2$$

## 9. Distance formula

The distance between two points

$A(x_1, y_1)$  and  $B(x_2, y_2)$  is

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

## **Rough/Draft work**

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