



MILITARY TECHNOLOGICAL COLLEGE

ACADEMIC YEAR 2017-2018

GENERAL STUDIES DEPARTMENT

GSD-EXIT EXAMINATION

Module Name	Basic Mathematics	Module Code	MTCG1016
Date:		Duration of Exam	90 Minutes

STUDENT DETAILS

Student ID.		Exam seat number	
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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, otherwise marks for method will be lost.
 - The figures shown, if any, are only for illustration.
 - A **Formula Sheet** is attached at the end of this paper.
 - **Do not open** this question paper until the invigilator has told you to do so.
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MARK DISTRIBUTION

Section	No. of Questions × Marks per Question = Total Marks Allocated	1 st Marking	2 nd Marking
A	$20 \times 1 = 20$ Marks		
B	$6 \times 5 = 30$ Marks		
Total = 50 Marks		/50	/50
Final Marks		/50	

1st Marker

Name and Signature

2nd Marker

Name and Signature

Section A

Answer all the following 20 questions. Each question carries 1 mark.

[Total Marks 20]

Circle the correct answer of the following questions e.g  (d)

1. Which of the following is Not a prime number?

a) 31

b) 51

c) 19

2. The solution for the equation $\frac{2x-2}{4} = \frac{3x-5}{2}$ is...

a) $x = -2$

b) $x = \frac{3}{8}$

c) $x = 2$

3. If $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$, when you make f , the subject of the formula...

a) $f = \frac{u+v}{uv}$

b) $f = \frac{uv}{u+v}$

c) $f = \frac{uv}{v-u}$

4. Which property is used in $12 \times (4 \times 8) = (12 \times 4) \times 8$

a) Commutative

b) Distributive

c) Associative

5. The solution for the inequality $-3 < 7 - 2x < 7$ is

a) $0 < x < 5$

b) $0 > x > 5$

c) $-5 < x < 0$

6. The angle $\frac{5\pi}{4}$ in degrees is

a) 225°

b) 3.925°

c) 135°

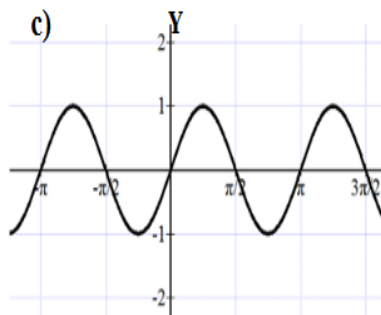
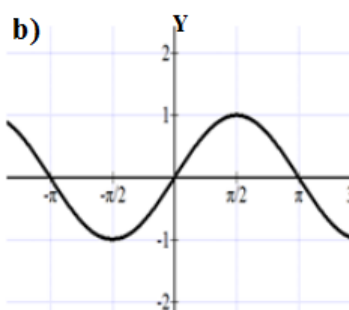
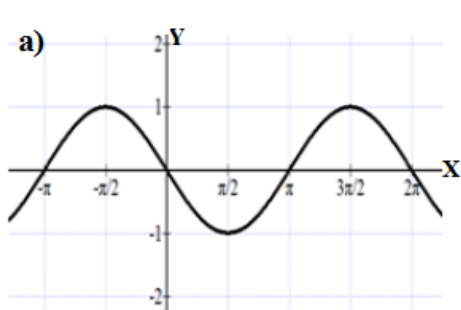
7. If $\tan A = \frac{3}{4}$, then $\sin A =$

a) $\frac{4}{5}$

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

c) $\frac{3}{4}$

8. Which of the following shows the graph of $y = -\sin x$?



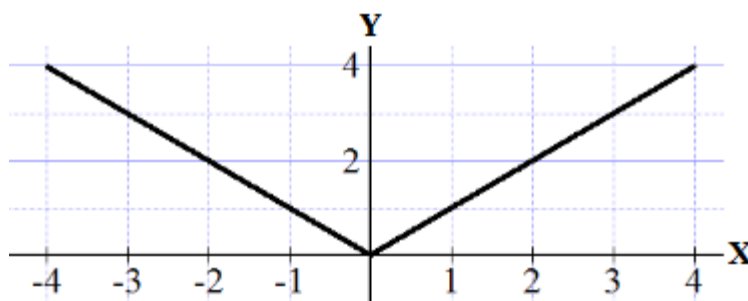
9. If a student who was absent for 14 hours during the term for basic Math was reported to have 20% absence, what were the total number of hours for Basic Math?

- a) 72 hours b) 16.8 hours c) 70 hours

10. If you change 300 K into *degrees Celcius* ($^{\circ}C$) you get:

- a) $-26.85^{\circ}C$ b) $26.85^{\circ}C$ c) $80.33^{\circ}C$

11. The following graph is symmetric about ...



- a) Y-axis b) X-axis c) Origin

12. Which of the following are Pythagorean triples?

- a) (4,9,16) b) (8,15, 17) c) (3,4,6)

13. Simplify the following : $2\frac{1}{3} + \frac{1}{4} - 2\frac{1}{2}$

- a) $\frac{3}{5}$ b) $\frac{1}{12}$ c) $\frac{1}{5}$

14. The value of y in the simultaneous equations: $x + 5y = 9$
 $3x - 5y = 7,$

is

a) 2

b) 4

c) 1

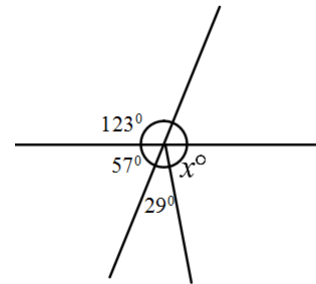
15. The period for the graph of the function $y = \sin \frac{1}{2}x$ is ...

a) 4π

b) 2π

c) π

16. The value of the angle marked x° is...



a) 57°

b) 94°

c) 66°

17. The equation of the circle, with center at $(-2,0)$ and radius 2 units is :

a) $x^2 + (y + 2)^2 = 4$

b) $(x - 2)^2 + y^2 = 2$

c) $(x + 2)^2 + y^2 = 4$

18. Factorise completely: $xy - 2x - 3y + 6$

a) $(x + 3)(y + 2)$

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

c) $(x - 3)(y - 2)$

19. The distance between the points $A(-1,1)$ and $B(-5,4)$ is ...

a) 5

b) -5

c) 4

20. Given the radius of a sector is $r = 4\text{cm}$ and the area $A = 8.4\text{cm}^2$.
The angle θ is ...

a) 2.1 radians

b) 1.05 radians

c) 60 radians

Section B

Answer all the following 5 questions showing all the steps in your answer.

Each question carries 6 marks.

[Total = 30 Marks]

1. a) Simplify: $\frac{3^n 9^{n-2}}{27^{n-1}}$

[3 Marks]

b) Simplify: $\frac{2x}{x^2-4} - \frac{1}{x+2}$

[3 Marks]

2. Find the equation of a straight line that passes through the points $A(-1, -2)$ and $B(1, 2)$

[6 Marks]

3. Given the universal set $U = \{x \mid x \text{ is a natural number less than } 10\}$
 $A = \{1, 3, 5, 7, 9\}$
 $B = \{2, 3, 5, 7\}$

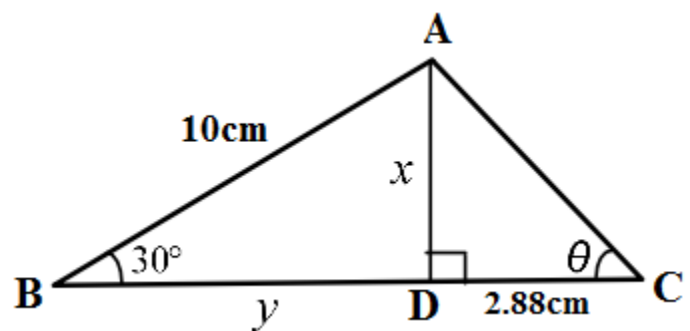
a) Draw a Venn Diagram to show the relationship between the sets, U, A and B .
[3 Marks]

b) List the elements of set A' **[1 Mark]**

c) What is the value of $n(A \cup B)$? **[1 Mark]**

d) List the elements of set $(A \cap B)'$ **[1 Mark]**

4. In the diagram below, find the values of the sides labelled x, y and the angle θ .
 Give your answers correct to 2 significant figures if not exact.



[6 Marks]

5. a) A number is 12 more than the other. Find the two numbers if their sum is 48.
[3 Marks]

b) Solve the quadratic equation : $3x^2 - 10x - 8 = 0$

[3 Marks]

END

Formula Sheet- GFP-Basic Maths

1. Conversions

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

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

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

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

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

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

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

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

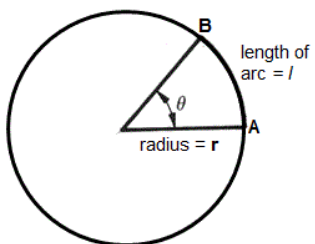
Temperature:

- $K = ^\circ C + 273.15$
- $^\circ F = 1.8 ^\circ C + 32$

Angles (radians and degrees)

- $1 \text{ degree} = \frac{\pi}{180} \text{ radians}$
- $1 \text{ radian} = \frac{180}{\pi} \text{ degrees}$

2. Sector and Arc

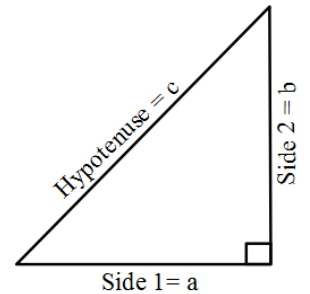


- Length of Arc, $l = r\theta$,
- Area of Sector, $A = \frac{1}{2}r^2\theta$
where θ is in radians.

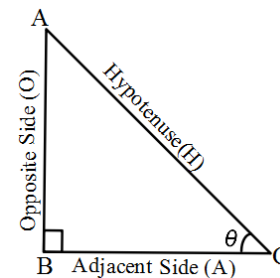
3. Pythagoras theorem

$$(\text{Side 1})^2 + (\text{Side 2})^2 = (\text{Hypotenuse})^2$$

$$\text{or } a^2 + b^2 = c^2$$



4. Trigonometry



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

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

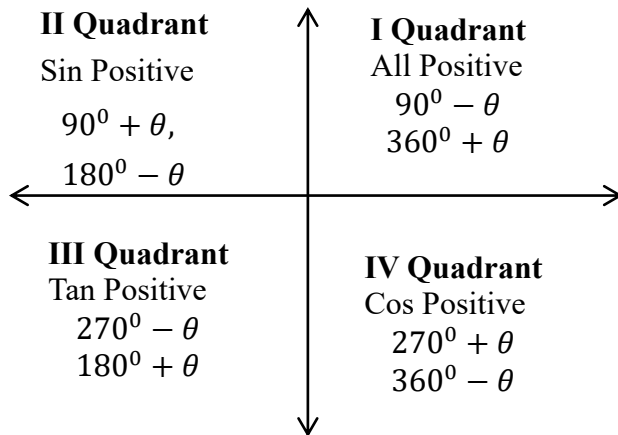
$$\tan \theta = \tan C = \frac{AB}{BC} = \frac{O}{A}$$

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

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

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

5. Quadrant System



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

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

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, $m = \frac{y_2 - y_1}{x_2 - x_1}$ = 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 Formula

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

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

Draft/Rough Work