S1023
GENERAL MATHEMATICS III
1 hour 45 minutes

Name:.....

Registration Number:.....

NATIONAL EXAMINATIONS COUNCIL
Senior School Certificate Examination

1 hour 45 minutes

GENERAL MATHEMATICS
PAPER III

Do **not** open this question booklet until you are told to do so. While waiting, read the following carefully:

1. Use **HB** pencil throughout.
2. **Use of mobile phone is not allowed.**
3. **Use of scientific calculator is allowed.**
4. **All diagrams are not drawn to scale.**
5. Take π to be $\frac{22}{7}$ **except** otherwise stated.
6. Where your answer sheet is **not** customised, provide the following information:
   (a) In the space marked *Candidate's Name*, write your **surname** in capital letters followed by your **other names.**
   (b) In the space marked *School Name*, write the name of your **school**, and in the space marked *Subject Name*, write **General Mathematics III.**
   (c) In the box marked *Subject Code*, write the digits **1023** in the spaces. There are numbered spaces in line with each digit. Shade carefully the space with the same number as each digit.
   (d) In the box marked *Registration Number*, write your **registration number** in the spaces at the top of the box. Shade the corresponding numbered spaces in the same way as for Subject Code.
7. An example is given below. This is for a candidate whose name is **GAMBO Bamidele Uche,** with **serial number 0010**, **registration number 8765432100BD,** and who is taking **General Mathematics III (1023).**

National Examinations Council **ANSWER SHEET**

Use HB pencil to complete this form. Mark like this ▬. Erase errors thoroughly.

Examination Type: SSCE ▬ BECE (I) (II) Other — If Other, write exam type in the box below — Absent

Candidate's Serial No. in School: 0 0 1 0

Subject Code: 1 0 2 3

Registration Number: 8 7 6 5 4 3 2 1 0 0 B D

Candidate's Name	GAMBO Bamidele Uche
School Number	0210231
School Name	Government Secondary School, Minna
Subject Name	General Mathematics III

PAPER III

Answer **all** questions.

Each question is followed by **five** options lettered **A** to **E**. Choose the correct option for each question and shade in **pencil** on your answer sheet the answer space that bears the same letter as the option you have chosen. Give only **one** answer to each question and erase completely any answer you wish to change. Do **all** rough work on this question paper.

An example is given below:

The product of three numbers is 3876. Two of the numbers are 17 and 19. What is the third number?

A. 57
B. 12
C. 6
D. 3
E. 2

The correct option is '12' which is lettered **B**. Therefore, answer space **B** would be shaded as shown below:

[A] [B] [C] [D] [E]

1. Express 384.126 to the nearest hundred.

A. 480
B. 400
C. 384
D. 380
E. 300

$384.126 = 400$

2. If A = {natural numbers between 3 and 15}, find n(A).

A. 15
B. 14
C. 13
D. 11
E. 10

$n(A) = 4, 5, 6, 7, 8, 9, 10, 11, 12, 13$ and 14.

$\Rightarrow n(A) = 11$

3. Evaluate $3241_{five} - 1342_{five}$.

A. 2341_{five}
B. 1344_{five}
C. 1342_{five}
D. 1324_{five}
E. 1234_{five}

$$\begin{array}{r} 3241 \\ -\ 1342 \\ \hline 1344 \end{array}$$

$\Rightarrow 3241_{five} - 1342_{five}$

$= 1344_{five}$

4. Simplify $(4\sqrt{3}-6)(4\sqrt{3}+6)$.

A. 12
B. 4
C. $2\sqrt{3}$
D. 2
E. $\sqrt{3}$

Conjugate binomial surd

$\Rightarrow (4\sqrt{3}-6)(4\sqrt{3}+6)$

$= 16 \times 3 - 36$

$= 48 - 36$

$= 12$

5. The third term of a Geometric Progression is – 5 and the seventh term is – 80. Find the common ratio.

A. 16
B. 8
C. 5
D. 3
E. 2

ar^{n-1}

$\Rightarrow 3rd\ term = ar^{3-1} = -5$

$= ar^2 = -5$

$a = \frac{-5}{r^2}$

$\Rightarrow a = \frac{-5}{r^2} \cdots (i)$

$7th\ term = ar^{7-1} = -80$

$ar^6 = -80$

$\Rightarrow a = \frac{-80}{r^6} \cdots (ii)$

Comparing both equations

$\frac{-5}{r^2} = \frac{-80}{r^6}$; $\frac{r^6}{r^2} = \frac{-80}{-5}$

$\Rightarrow r^4 = 16$; $\Rightarrow r = \sqrt[4]{16}$

$= 2$

6. A man with an annual salary of ₦1,300,000.00 is to pay an income tax of 22%. Calculate his tax, if his allowances amount to ₦137,000.00.

A. ₦254,760.00
B. ₦255,860.00
C. ₦258,860.00
D. ₦350,140.00
E. ₦907,140.00

Income tax is
Salary − Allowance
₦1,300,000 −
₦137,000
= ₦1,163,000
⇒ tax = 22% × ₦1,163,000 / 100%

7. A wire of length 25 cm was measured by a student to be 24.4 cm. Find the percentage error.

A. 4.4
B. 3.4
C. 2.4
D. 1.4
E. 0.4

% error = error × 100% / actual length
error = 25 − 24·4 = 0·6
⇒ % error = 0·6 × 100% / 25
= 2·4

8. How many years will ₦12,000.00 saved in a bank amount to ₦12,960.00 at 2% per annum simple interest?

A. 6
B. 5
C. 4
D. 3
E. 2

Amount = I + P
⇒ ₦12,960 = I + ₦12,000
⇒ I = ₦960
I = PRT / 100%; 960 = 12,000 × 2 × T / 100%
⇒ T = 96,000 / 24,000 = 4 years

9. Rationalize $\frac{5}{\sqrt{2}+\sqrt{3}}$.

A. $5(\sqrt{3}-\sqrt{2})$
B. $5(\sqrt{2}+\sqrt{3})$
C. $5(\sqrt{2}-\sqrt{3})$
D. $\sqrt{3}+5\sqrt{2}$
E. $\sqrt{3}+2\sqrt{5}$

$\frac{5}{\sqrt{2}+\sqrt{3}}$ Rationalizing denominator

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

$\Rightarrow \frac{5(\sqrt{2}-\sqrt{3})}{2-3}$

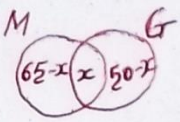
$\Rightarrow \frac{5(\sqrt{2}-\sqrt{3})}{-1}$

$\Rightarrow -5(\sqrt{2}-\sqrt{3})$ multiply by +

$\Rightarrow 5(\sqrt{2}+\sqrt{3})$

10. In a class of 80 students, every student studies Mathematics or Geography or both. If 65 students study Mathematics and 50 study Geography, how many study both subjects?

A. 45
B. 35
C. 30
D. 20
E. 15



⇒ 65 − x + x + 50 − x = 80
115 − x = 80
⇒ x = 115 − 80; x = 35

11. The 11th term of an Arithmetic Progression is 63. Find the first term, if its common difference is 3.

A. 65
B. 63
C. 35
D. 33
E. 30

$T_n = a + (n-1)d$
63 = a + (11 − 1)3
63 = a + 30
⇒ a = 63 − 30
= 33

12. Evaluate 15⊗26 in modulo 5.

A. 0 (mod 5)
B. 1 (mod 5)
C. 2 (mod 5)
D. 4 (mod 5)
E. 5 (mod 5)

15 ⊗ 26 (mod 5)
15 ⊗ 26 = 390
⇒ 390 / 5 = 78 Rem. 0
⇒ 15 ⊗ 26 = 0 (mod 5)

13. Solve $2^{3x} = 16^{\frac{3}{4}}$.

A. 8
B. 4
C. 3
D. 2
E. 1

$2^{3x} = 16^{3/4}$
Raising both sides to same base
=
$\Rightarrow 2^{3x} = (2^4)^{3/4}$
$2^{3x} = 2^{12/4}$
$\Rightarrow 2^{3x} = 2^3$
Striking off the similar base on both sides
$\Rightarrow 2^{3x} = 2^3$
$\Rightarrow 3x = 3$
$\Rightarrow x = \frac{3}{3} = 1$

14. If Olu, Tony and Tunde share ₦240,000.00 in the ratio 2:3:5 respectively, what is two-thirds of Tunde's share?

A. ₦120,000.00
B. ₦80,000.00
C. ₦72,000.00
D. ₦48,000.00
E. ₦40,000.00

Total ratio = 10
Tunde = $\frac{5}{10}$(₦240K)
= $\frac{1,200,000}{10}$
= ₦120,000
⇒ $\frac{2}{3}$(₦120,000)
= ₦80,000

15. Arrange the following fractions in ascending order of magnitude;
$\frac{2}{3}, \frac{3}{5}, \frac{5}{12}, \frac{4}{15}, \frac{3}{10}$.

(A.) $\frac{4}{15}, \frac{3}{10}, \frac{5}{12}, \frac{3}{5}, \frac{2}{3}$
B. $\frac{3}{10}, \frac{4}{15}, \frac{5}{12}, \frac{3}{5}, \frac{2}{3}$
C. $\frac{4}{15}, \frac{5}{12}, \frac{3}{10}, \frac{3}{5}, \frac{2}{3}$
D. $\frac{4}{15}, \frac{5}{12}, \frac{3}{5}, \frac{3}{10}, \frac{2}{3}$
E. $\frac{2}{3}, \frac{3}{5}, \frac{5}{12}, \frac{4}{15}, \frac{3}{10}$

16. Find the values of x, y and z respectively for which $\begin{bmatrix} x & 2y \\ z & 9 \end{bmatrix} = \begin{bmatrix} 4 & 12 \\ 3 & 9 \end{bmatrix}$.

A. (6, 4, 3)
(B.) (4, 6, 3)
C. (6, 3, 4)
D. (3, 4, 6)
E. (4, 4, 6)

$\begin{bmatrix} x & 2y \\ z & 9 \end{bmatrix} = \begin{bmatrix} 4 & 12 \\ 3 & 9 \end{bmatrix}$

⇒ $x = 4$
$2y = 12$; $y = \frac{12}{2} = 6$
$z = 3$
⇒ x, y and $z = 4, 6, 3$

17. If $P = \begin{bmatrix} -1 & 2 \\ 3 & 1 \end{bmatrix}$ and $Q = \begin{bmatrix} 2 & 3 \\ 2 & 1 \end{bmatrix}$, find PQ.

A. $\begin{bmatrix} 2 & 1 \\ -8 & -10 \end{bmatrix}$
B. $\begin{bmatrix} 2 & 1 \\ 8 & 10 \end{bmatrix}$
C. $\begin{bmatrix} -2 & 1 \\ 8 & 10 \end{bmatrix}$
D. $\begin{bmatrix} -2 & -1 \\ 8 & 10 \end{bmatrix}$
(E.) $\begin{bmatrix} 2 & -1 \\ 8 & 10 \end{bmatrix}$

$PQ = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} = \begin{bmatrix} 2 & -1 \\ 8 & 10 \end{bmatrix}$
$a_{11} = (-1\ 2)\begin{bmatrix} 2 \\ 2 \end{bmatrix}$
$= -1\times2 + 2\times2 = 2$
$a_{12} = (-1\ 2)\begin{bmatrix} 3 \\ 1 \end{bmatrix}$
$= -1\times3 + 2\times1 = -1$
$a_{21} = (3\ 1)\begin{bmatrix} 2 \\ 2 \end{bmatrix}$
$= 6 + 2 = 8$
$a_{22} = (3\ 1)\begin{bmatrix} 3 \\ 1 \end{bmatrix}$
$= 9 + 1 = 10$

18. Evaluate $\log_4 16 + \log_3 27 - \log_8 4096$.

A. $\frac{1}{9}$
B. $\frac{1}{3}$
(C.) 1
D. 2
E. 3

$\log_4 4^2 + \log_3 3^3 - \log_8 8^4$
⇒ $2\log_4 4 + 3\log_3 3 - 4\log_8 8$
⇒ $2(1) + 3(1) - 4(1)$
⇒ $2 + 3 - 4 = 1$

19. Solve the equation $\frac{4x}{5} - \frac{7}{3} = \frac{5x}{12}$.

A. $-6\frac{2}{23}$
B. $-3\frac{1}{2}$
C. $5\frac{2}{23}$
(D.) $6\frac{2}{23}$
E. $6\frac{3}{23}$

$\frac{4x}{5} - \frac{7}{3} = \frac{5x}{12}$
$\frac{(12\times4x) - (20\times7)}{60} = \frac{5\times5x}{60}$
⇒ $48x - 140 = 25x$
⇒ $48x - 25x = 140$
$23x = 140$
$x = \frac{140}{23}$
$= 6\frac{2}{23}$

20. If $f(x) = 3x^2 - 9x - 5$, find $f(-3)$.

A. −5
B. 5
C. 27
D. 49
E. 54

$f(-3) = 3(-3)^2 - 9(-3) - 5$
$= 3(9) + 27 - 5$
$= 27 + 22$
$= 49$

21. Find u in terms of f and v in the relation $\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$.

A. $u = \frac{-f}{(v-f)}$
B. $u = \frac{fv}{(f-v)}$
C. $u = \frac{fv}{(v+f)}$
(D.) $u = \frac{fv}{(v-f)}$
E. $u = \frac{fv}{2(f+v)}$

$\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$
Inverting both sides of the equations;
$v = f - u$
$\Rightarrow u = f - v$
Same as $u = \frac{fv}{(v-f)}$
i.e: $f - v = \frac{fv}{(v-f)}$
$= \frac{fv}{v} - \frac{fv}{f} = \frac{fv}{v} - \frac{fv}{f}$

22. Find the quadratic equation whose roots are −1 and 5.

(A.) $x^2 - 4x - 5 = 0$
B. $x^2 - 4x + 1 = 0$
C. $x^2 - 4x + 5 = 0$
D. $x^2 + 4x - 5 = 0$
E. $x^2 + 4x + 5 = 0$

Using the formula
$x^2 - (\alpha+\beta)x + \alpha\beta$
$x^2 - (-1+5)x + (-1 \times 5)$
$x^2 - (4)x + (-5)$
$x^2 - 4x - 5 = 0$

23. The product of two numbers is 40 and their sum is 13, find the numbers.

A. 2 and 20
B. 2 and 8
C. 4 and 10
D. 4 and 8
(E.) 5 and 8

let the two numbers be x and y. Then,
$xy = 40$; $x + y = 13$
from $x + y = 13$
$y = 13 - x$
Substituting for y in the first equation
$xy = 40$; $x(13-x) = 40$
$\Rightarrow 13x - x^2 = 40$
$\Rightarrow x^2 - 13x + 40 = 0$
$\Rightarrow (x-8)(x-5) = 0$
$\Rightarrow x = 8$ or 5
$\Rightarrow x$ and $y = 5$ and 8

24. If $(x+6)$ is a factor of $x^2 + 4x - 12$, find the other factor.

(A.) $(x-2)$
B. $(x-6)$
C. $(x+2)$
D. $(x+4)$
E. $(x+6)$

Factors will multiply the equation to give zero. Therefore, we test from the options
$(x-2)$; $x=2$; $(2)^2 + 4(2) - 12$
$4 + 8 - 12 = 0$ ✓
$(x-6)$; $x=6$; $(6)^2 + 4(6) - 12$
$36 + 24 - 12 = 48 \neq$

25. Calculate the mid-point of the line joining (8, − 3) and (−2, 3).

A. (− 3, 0)
B. (0, 5)
(C.) (3, 0)
D. (0,3)
E. (5, 0)

The mid points on the x and y axes are;
$\frac{x_1 + x_2}{2}$ and $\frac{y_1 + y_2}{2}$
$\frac{8 + -2}{2} = 3$; $\frac{-3+3}{2} = 0$
(3, 0)

26. Calculate the gradient of a line joining the points (− 2, − 5) and (4, 8), correct to 1 decimal place.

A. 4.2
B. 3.4
C. 3.2
(D.) 2.2
E. 2.1

Gradient $M = \frac{y_2 - y_1}{x_2 - x_1}$
$\Rightarrow M = \frac{8 - (-5)}{4 - (-2)} = \frac{13}{6}$
$= 2.2$

27. Given the statements:
p: All terrorists are guilty
q: All terrorists are criminals
Write the following statement in symbolic form; "All terrorists are **not** guilty but criminals".

A. $p \vee q$
B. $p \wedge q$
C. $p \wedge \sim q$
D. $\sim p \vee q$
(E.) $\sim p \wedge q$

$\sim p \vee q$ is either ways while $\sim p \wedge q$ is Conclusive or specific as the question.

$\sim p \wedge q$ = All terrorists are not guilty, and all terrorists are Criminals

From the question: "All terrorists are not guilty but Criminals"

And ($\wedge$) can be used to represent the but as both are specific in the context of the qst. While or ($\vee$) is either ways

28. Simplify $\dfrac{x+\frac{1}{3}}{x+\frac{1}{2}}$.

$\left(x+\frac{1}{3}\right)\div\left(x+\frac{1}{2}\right)$

$\left(\frac{x+\frac{1}{3}}{\frac{3x+1}{3}}\right)\div\left(\frac{x+\frac{1}{2}}{\frac{2x+1}{2}}\right)$

$\frac{3x+1}{3}\times\frac{2}{2x+1}$

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

(A.) $\dfrac{2(3x+1)}{3(2x+1)}$

B. $\dfrac{2+x}{3+x}$

C. $\dfrac{x+1}{x-1}$

D. $\dfrac{3x+1}{2x-1}$

E. $\dfrac{x^2}{x-1}$

29. Find the equation of a line whose gradient is 6 and y-intercept is -7.

Using the form $y=mx+c$

$y=6x+(-7)$

$y=6x-7$

$y=-7+6x$

A. $y=8+7x$
B. $y=-7-6x$
C. $y=7-6x$
(D.) $y=-7+6x$
E. $y=7+6x$

30. Find the sum of the roots of the quadratic equation $x^2-5x+6=0$.

$x^2-5x+6=0$

$x^2-3x-2x+6=0$

$\Rightarrow x=3$ or 2

$\Rightarrow 3+2=5$

A. 10
(B.) 5
C. -2
D. -3
E. -5

31. Find the roots of the equation $8x^2-6x-9=0$.

$8x^2-6x-9=0$

$8x^2+12x-6x-9=0$

$4x(2x+3)-3(2x+3)=0$

$(4x-3)(2x+3)=0$

$\Rightarrow 4x=3,\ 2x=-3$

$\Rightarrow x=\frac{3}{4}$ or $\frac{-3}{2}$

A. $x=\frac{3}{2}$ or $\frac{-4}{3}$
B. $x=\frac{3}{2}$ or $\frac{-3}{4}$
C. $x=\frac{3}{2}$ or $\frac{3}{4}$
(D.) $x=\frac{-3}{2}$ or $\frac{3}{4}$
E. $x=\frac{-3}{2}$ or $\frac{-3}{4}$

32. Expand $(2x-3)(3x+4)$.

$6x^2+8x-9x-12$

$6x^2-x-12$

A. $6x^2-17x-12$
(B.) $6x^2-x-12$
C. $6x^2-x+12$
D. $6x^2+x-12$
E. $6x^2+17x-12$

33. The difference between the present ages of two brothers is 6 and their product is 135. What is the sum of their ages?

Let the younger age be x,
then the old age is $x+6$

$\Rightarrow$ their product is $x(x+6)=135$

$\Rightarrow x^2+6x=135;\ x^2+6x-135=0$

$\Rightarrow x^2+15x-9x-135=0$

$x(x+15)-9(x+15)=0$

$\Rightarrow (x-9)(x+15)=0$

$\Rightarrow x-9=0$ or $x+15=0$

$\Rightarrow x=9$ or $x=-15$

$\Rightarrow x=9$ and the older age is $9+6=15$

$\Rightarrow$ the ages are 9 and 15
and their sum $=9+15=24$

A. 27
(B.) 24
C. 22
D. 21
E. 15

34. In **Fig. 3.1**, PQS is a circle with centre O. RST is a tangent at S and ∠ SOP = 120°. Find ∠ PST.

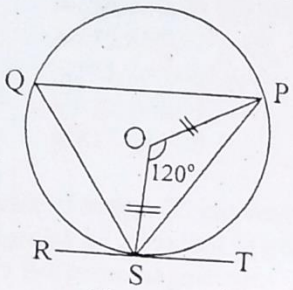


Fig. 3.1

A.	64°	ΔSOP is isosceles
(B.)	60°	⇒∠OSP = ½(180−120)
C.	35°	= 30°
D.	31°	∠OST = 90 (⊥ tan. radius)
E.	29°	⇒∠PST = 90−30
		= 60°

35. In **Fig. 3.2**, A, B, C and D are points on a circle with centre O. $\overline{BA}$ is produced to M.
If ∠ MAD = 82° and ∠ ADO = 74°, find ∠ ABO.

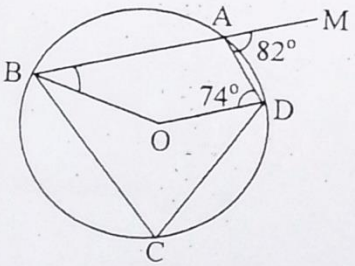


Fig. 3.2

(A.)	24°
B.	74°
C.	82°
D.	98°
E.	164°

∠BCD = 82 (exterior ∠ of cyclic quad. is equal to interior opp. ∠)

∠BOD = 2×82 (∠ at center is twice ∠ at circumference)
= 164°

∠DAB = 180−82 (∠ on straight line)
= 98°

⇒∠ABO = 360−(74+164+98) (sum of interior Quad.)
= 360−336 = 24°

36. Calculate the area of trapezium ABCD in **Fig. 3.3**.

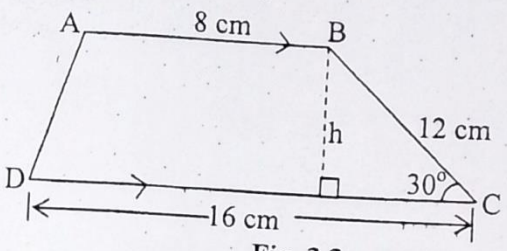
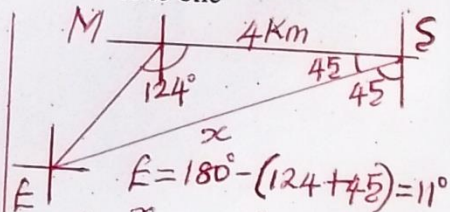


Fig. 3.3

A.	27 cm²	Area of trapezium ½h(l+l)
B.	36 cm²	h = 12×sin30 = 12×0.5 = 6
(C.)	72 cm²	⇒Area of Trap = ½×6(8+16)
D.	92 cm²	= 3(24)
E.	144 cm²	= 72cm²

37. A boy walks 4 km due West. He then changes direction and walks on a bearing of 214° until he is South-West of his starting point. How far is he from his starting point? Correct your answer to one decimal place.

A.	5.1 km
B.	8.3 km
C.	11.1 km
D.	15.7 km
(E.)	17.4 km



E = 180°−(124+45) = 11°

⇒ $\frac{x}{\sin 124} = \frac{4}{\sin 11}$; ⇒x = 17.4

x = 17.4Km

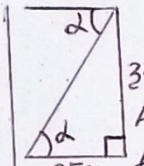
38. Two points P and Q lie on the same great circle. P is on latitude 70°N and Q is on latitude 55°N. Calculate their difference in latitudes.

(A.)	15°
B.	25°
C.	45°
D.	65°
E.	125°

Their difference in latitude is 70−55 = 15°

39. A bird which is on top of a building 35 m high observes a prey 25 m away from the foot of the building. Calculate the angle of depression of the prey from the bird.

A. 75.00°
B. 60.00°
(C.) 54.46°
D. 35.25°
E. 10.00°



Angle of Dep. = α
$\tan\alpha = \frac{35}{25} = 1.4$
$\Rightarrow \alpha = \tan^{-1}1.4 = 54.5$

40. Calculate the length of an arc which subtends an angle of 66° at the centre of a circle of radius 8 cm, correct to one decimal place.

A. 3.4 cm
B. 5.2 cm
C. 7.4 cm
(D.) 9.2 cm
E. 12.3 cm

Length of arc $\frac{\theta}{360} 2\pi r$
$\frac{66}{360} \times 2 \times 3.143 \times 8$
$\frac{3319.008}{360} = 9.2\text{cm}$

41. Find the value of y in **Fig. 3.4**.

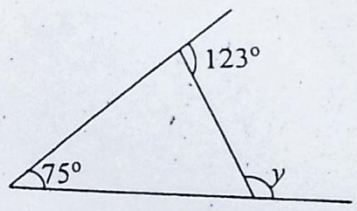
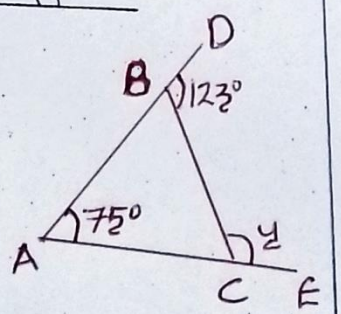


Fig. 3.4

A. 48°
B. 57°
C. 105°
(D.) 132°
E. 198°



$\angle ABC = 180 - 123$ (straight line)
$= 57°$
$\Rightarrow y = 75 + 57$ (ext. ∠ of triangle)
$= 132°$

42. The base radius and height of a cone are 4 cm and 6 cm respectively. Calculate its volume, correct to the nearest whole number.

A. 75 cm³
B. 86 cm³
C. 98 cm³
(D.) 101 cm³
E. 110 cm³

Volume of cone $\frac{1}{3}\pi r^2 h$
$= \frac{1}{3} \times 3.143 \times 4^2 \times 6$
$= \frac{301.728}{3} = 100.6$
$= 101\text{cm}^3$

43. Find the distance between the points (3, −4) and (−5, 2).

A. 18
B. 16
C. 14
D. 12
(E.) 10

$\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$
$\sqrt{(-5-3)^2+(2--4)^2}$
$\sqrt{(-8)^2+6^2}$; $\sqrt{64+36} = 10$

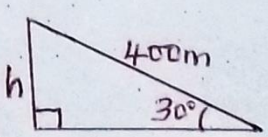
44. Calculate the surface area of a sphere with diameter 10.4 cm, correct to 3 significant figures. (Take $\pi = 3.142$)

A. 439 cm²
B. 400 cm²
(C.) 340 cm²
D. 339 cm²
E. 338 cm²

Surface area of sphere $4\pi r^2$
$r = \frac{1}{2}$ diameter $= \frac{1}{2} \times 10.4$
$= 5.2$
$\Rightarrow$ S.Area $= 4 \times 3.142 \times 5.2^2$
$= 340\text{cm}^2$

45. Obi walks 400 m to the top of a hill which slopes at angle 30° to the horizontal. Determine the height of the hill.

A. 430 m
B. $400\sqrt{3}$m
C. $200\sqrt{3}$ m
(D.) 200 m
E. 100 m



$h = 400 \sin 30$
$= 400 \times 0.5$
$= 200\text{m}$

53. Calculate the variance of the following set of numbers; $\bar{x} = \frac{155}{5} = 31$
30, 28, 35, 25, 37.

A. 31.0
B. 25.1
C. 19.6
D. 19.5
E. 15.3

x	$x-\bar{x}$	$\lvert d\rvert^2$
25	−6	36
28	−3	9
30	−1	1
35	4	16
37	6	36

$\text{Var}\,\sigma^2 = \frac{\Sigma|d|^2}{n}$

$\Sigma|d|^2 = 98$

$n = 5$

$\Rightarrow \sigma^2 = \frac{98}{5} = 19.6$

54. If the tickets numbered 1 to 16 inclusive are mixed up and a ticket is drawn at random, what is the probability that the ticket drawn is a multiple of 2 or 3?

A. $\frac{5}{16}$
B. $\frac{1}{2}$
C. $\frac{5}{8}$
D. $\frac{11}{16}$
E. $\frac{13}{16}$

1 to 16 inclusive = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16

Multiples of 2 = 2, 4, 6, 8 ··· 16

Multiples of 3 = 3, 6, 9 ··· 15

$\Rightarrow$ Multiples of 2 are 8

Multiples of 3 are 5

$\Rightarrow P(\text{mult. of 2 or 3}) = \frac{8}{16} + \frac{5}{16} = \frac{13}{16}$

55. The following are the lucky numbers in a raffle draw; 4, 5, 12, 20, 2, 8, 3, 6, 10, 9, 7, 25, 12, 10, 14, 27.
If a number is picked at random, what is the probability that it is a perfect cube?

A. $\frac{11}{16}$
B. $\frac{5}{8}$
C. $\frac{7}{16}$
D. $\frac{3}{8}$
E. $\frac{1}{8}$

The perfect cube from the set of numbers are 8 and 27 only

$\Rightarrow P(\text{perfect cube}) = \frac{2}{16}$

$= \frac{1}{8}$

56. The probability that it will rain in Lagos and Oyo on the same day are $\frac{3}{4}$ and $\frac{1}{2}$ respectively. Find the probability that it will not rain in both towns on the same day.

A. $\frac{1}{12}$
B. $\frac{1}{8}$
C. $\frac{1}{6}$
D. $\frac{1}{4}$
E. $\frac{1}{2}$

$P(\text{it will rain in both}) = \frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$

$P(\text{it will not rain in both cities}) = \frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$

57. **Table 3.1:** Ages of students

Age (years)	16	17	18
No of students	4	8	6

Table 3.1 shows the ages of students in a particular class. What is the probability that a student chosen at random is less than 18 years?

A. $\frac{9}{10}$
B. $\frac{4}{5}$
C. $\frac{2}{3}$
D. $\frac{1}{2}$
E. $\frac{1}{3}$

Sample space $S = 4 + 8 + 6 = 18$

$P(\text{less than } 18) = \frac{4}{18} + \frac{8}{18}$

$= \frac{12}{18}$

$= \frac{2}{3}$

Use the information below to answer questions **58 - 60**.

A particle moves a distance of S metres, where $S = 5t^3 - 12t^2 + 7$.

58. At what time is its acceleration equals zero?

A. 0.8 sec
B. 1.2 sec
C. 1.6 sec
D. 2.0 sec
E. 2.5 sec

59. Find the velocity after 3 seconds.

A. 70 m/s
B. 63 m/s
C. 50 m/s
D. 40 m/s
E. 30 m/s

60. Find the acceleration after 12 seconds.

A. 400 m/s^2
B. 360 m/s^2
C. 336 m/s^2
D. 300 m/s^2
E. 180 m/s^2