SC 4021
WASSCE (SC) 2022
GENERAL MATHEMATICS/
MATHEMATICS (CORE) 1
Objective Test
$1\frac{1}{2}$ hours

1

THE WEST AFRICAN EXAMINATIONS COUNCIL

West African Senior School Certificate Examination (WASSCE) for School Candidates, 2022

SC 2022   GENERAL MATHEMATICS/MATHEMATICS (CORE) 1 $1\frac{1}{2}$ hours

OBJECTIVE TEST
[50 marks]

Do not open this booklet until you are told to do so. While you are waiting, write your **name** *in the spaces provided at the top right-hand corner of this booklet. In the box marked* **index number,** *check that your centre and candidate's numbers are correctly printed and thereafter, read the following instructions carefully.*

1.   Use **HB pencil** throughout.
2.   If you have got a blank answer sheet, complete its top section as follows.
     (a) In the space marked *Name,* write in capital letters your **surname** followed by your **other names.**
     (b) In the spaces marked *Examination, Year, Subject* and *Paper,* write 'WASSCE (SC)', '2022', 'GENERAL MATHEMATICS/MATHEMATICS (CORE)' and '1' respectively.
     (c) In the box marked *Index Number,* write your **index number** vertically in the spaces on the left-hand side. 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 *Paper Code,* write the digits 402112 in the spaces on the left-hand side. **Shade** the corresponding numbered spaces in the same way as for your index number.
     (e) In the box marked *Sex,* shade the space marked **M** if you are **male,** or **F** if you are **female.**
3.   If you have got a pre-printed answer sheet, check that the details are correctly printed, as described in **2** above. In the boxes marked *Index Number, Paper Code* and *Sex,* reshade each of the shaded spaces.
4.   An example is given below. This is for a **male** candidate whose name is **Chinedu Oladapo DIKKO,** whose index number is **4251102068** and who is offering General Mathematics/Mathematics (Core) 1.

THE WEST AFRICAN EXAMINATIONS COUNCIL

PRINT IN BLOCK LETTERS

Name: DIKKO CHINEDU OLADAPO   Examination: WASSCE (SC) Year: 2022
         Surname   Other Names

Subject: GENERAL MATHEMATICS/MATHEMATICS (CORE)   Paper: 1

INDEX NUMBER	PAPER CODE	SEX
4 2 5 1 1 0 2 0 6 8	4 0 2 1 1 2	Indicate your sex by shading the space marked M (for Male) or F (for Female) in this box: M F

INSTRUCTIONS TO CANDIDATES
1. Use grade HB pencil throughout.
2. Answer each question by choosing one letter and shading it like this: [A] [B] [C] ▬
3. Erase completely any answer(s) you wish to change.
4. Leave extra spaces blank if the answer spaces provided are more than you need.
5. Do not make any markings across the heavy black marks at the right-hand edge of your answer sheet.

For Supervisors only.
If candidate is absent shade this space: [   ]

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*Answer **all** the questions.*

Mathematical tables may be used in any question.

The use of non-programmable, silent and cordless calculator is allowed.

Each *question is followed by* **four** *options lettered* A *to* D. *Find the correct option for* **each** *question and shade* **in pencil,** *on your answer sheet, the answer space which bears the same letter as the option you have chosen. Give only* **one** *answer to* **each** *question. An example is given below.*

The ages, in years, of four boys are 10, 12, 14 and 18. What is the average age of the boys?

A. 12 years

B. $12\frac{1}{2}$ years

C. 13 years

D. $13\frac{1}{2}$ years

The correct answer is $13\frac{1}{2}$ *years, which is lettered* D, *and therefore answer space* D *would be shaded.*

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

Think carefully before you shade the answer spaces; erase completely any answer you wish to change.

Do **all** *rough work on this question paper.*

Now answer the following questions.

1. Evaluate, correct to **four** significant figures, (573.06 × 184.25).

    A. 105600.00

    B. 105622.00

    C. 105500.00

    D. 105532.00

2. Change 432_{five} to a number in base three.

    A. 10100_{three}

    B. 11100_{three}

    C. 11101_{three}

    D. 10110_{three}

3. Given that A and B are sets such that $n(A) = 8$, $n(B) = 12$ and $n(A \cap B) = 3$, find $n(A \cup B)$.

    A. 15

    B. 17

    C. 20

    D. 23

4. If $\sqrt{24} + \sqrt{96} - \sqrt{600} = y\sqrt{6}$, find the value of y.

    A. 4

    B. 2

    C. −2

    D. −4

5. Evaluate $23 \times 54 \pmod 7$.

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

6. If $4^{3x} = 16^{x+1}$, find the value of x.

   A. -2
   B. 2
   C. 1
   D. -1

7. A weaver bought a bundle of grass for $ 50.00 from which he made 8 mats. If **each** mat was sold for $ 15.00, find the percentage profit.

   A. 240 %
   B. 140 %
   C. 120 %
   D. 40 %

8. Find the 17$^{\text{th}}$ term of the Arithmetic Progression (*A. P.*): $-6 , -1 , 4, \ldots$

   A. -91
   B. -86
   C. 74
   D. 79

9. M varies directly as n and inversely as the square of p. If $M = 3$ when $n = 2$ and $p = 1$, find M in terms of n and p.

   A. $M = \dfrac{3n}{2p^2}$

   B. $M = \dfrac{2n}{3p^2}$

   C. $M = \dfrac{2n}{3p}$

   D. $M = \dfrac{3n^2}{2p^2}$

10. If $a = 3$ and $b = -7$, find the value of $\dfrac{5b+(a+b)^2}{(a-b)^2}$.

    A. 0.51
    B. 0.19
    C. -0.19
    D. -0.51

11. Three boys shared D 10,500.00 in the ratio $6 : 7 : 8$. Find the **largest share**.

    A. D 4,000.00
    B. D 5,000.00
    C. D 4,500.00
    D. D 3,500.00

12. The length of a piece of stick is 1.75 m. A boy measured it as 1.80 m. Find the percentage error.

    A. $4\frac{4}{7}\%$

    B. $2\frac{6}{7}\%$

    C. $2\frac{7}{9}\%$

    D. $4\frac{7}{9}\%$

13. If $5x + 3y = 4$ and $5x - 3y = 2$, what is the value of $(25x^2 - 9y^2)$?

    A. 20
    B. 16
    C. 2
    D. 8

14. Mary has $ 3.00 **more** than Ben but $ 5.00 **less** than Jane. If Mary has $ x, how much does Jane and Ben have altogether?

    A. $ $(2x - 8)$
    B. $ $(2x + 8)$
    C. $ $(2x - 2)$
    D. $ $(2x + 2)$

15. Consider the statements:

p: Stephen is intelligent
q: Stephen is good at Mathematics

If $p \Rightarrow q$, which of the following is a **valid** conclusion?

- A. If Stephen is good at Mathematics, then he is intelligent
- B. If Stephen is not good at Mathematics, then he is not intelligent
- C. If Stephen is not intelligent, then he is not good at Mathematics
- D. If Stephen is not good at Mathematics, then he is intelligent

16. What value of p will make $(x^2 - 4x + p)$ a perfect square?

- A. -2
- B. 16
- C. 4
- D. -8

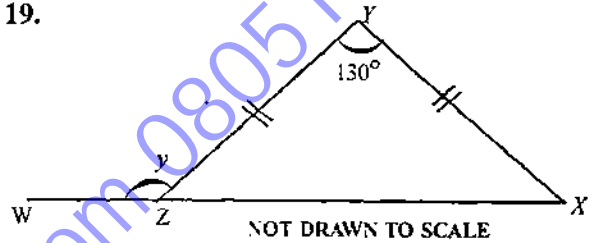**17.** Find the value of x such that $\frac{1}{x} + \frac{4}{3x} - \frac{5}{6x} + 1$ is zero.

- A. $\frac{1}{6}$
- B. $\frac{1}{4}$
- C. $-\frac{3}{2}$
- D. $-\frac{7}{6}$

18. Make t the subject of $k = m\sqrt{\dfrac{t-p}{r}}$.

- A. $t = \dfrac{rk^2 + p}{m^2}$
- B. $t = \dfrac{rk^2 + pm^2}{m^2}$
- C. $t = \dfrac{rk^2 - p}{m^2}$
- D. $t = \dfrac{rk^2 + p^2}{m^2}$

19.

NOT DRAWN TO SCALE

In the diagram, $\overline{XY} = |\overline{YZ}|$ and $\angle XYZ = 130°$. Find the value of y.

- A. $50°$
- B. $65°$
- C. $25°$
- D. $155°$

20. An exterior angle of a regular polygon is $22.5°$. Find the number of sides.

- A. 13
- B. 14
- C. 15
- D. 16

4
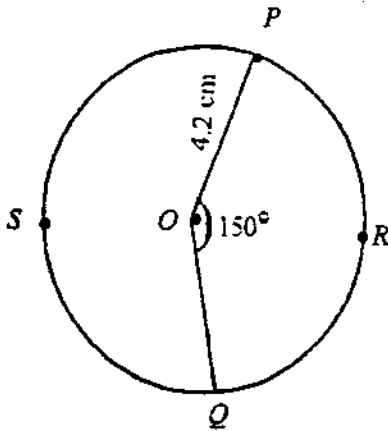
NOT DRAWN TO SCALE

In the diagram, ∠POQ = 150° and the radius of the circle PSQR is 4.2 cm.

[Take $\pi = \frac{22}{7}$]

Use the information to answer questions 21 and 22.

21. Find the length of the minor arc PRQ.

    A. 11.00 cm
    B. 15.40 cm
    C. 17.64 cm
    D. 23.10 cm

22. Find the area of the sector OPSQ.

    A. 15.40 cm²
    B. 17.64 cm²
    C. 23.10 cm²
    D. 32.34 cm²

23. A ladder 6 m long leans against a vertical wall at an angle 53° to the horizontal. How high up the wall does the ladder reach?
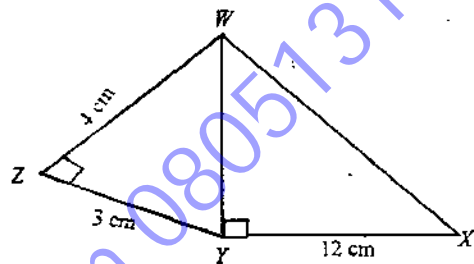
    A. 3.611 m
    B. 4.521 m
    C. 4.792 m
    D. 3.962 m

24. A cylinder, opened at one end, has a radius of 3.5 cm and height 8 cm. Calculate the total surface area. [Take $\pi = \frac{22}{7}$]

    A. 126.5 cm²
    B. 165.0 cm²
    C. 212.0 cm²
    D. 214.5 cm²

NOT DRAWN TO SCALE

25. In the diagram, ∠WZY and ∠WYX are right angles. Find the perimeter of WXYZ.

    A. 30 cm
    B. 32 cm
    C. 35 cm
    D. 37 cm

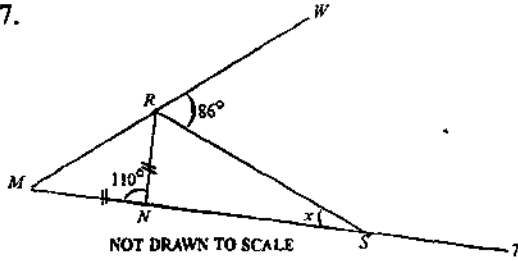26. The length of a rectangle is 10 cm. If its perimeter is 28 cm, find the area.

    A. 30 cm²
    B. 40 cm²
    C. 60 cm²
    D. 80 cm²

27.

NOT DRAWN TO SCALE

In the diagram, MRW and $MNST$ are straight lines. $|\overline{MN}| = |\overline{NR}|$, $\angle MNR = 110°$ and $\angle WRS = 86°$. Find the value of x.
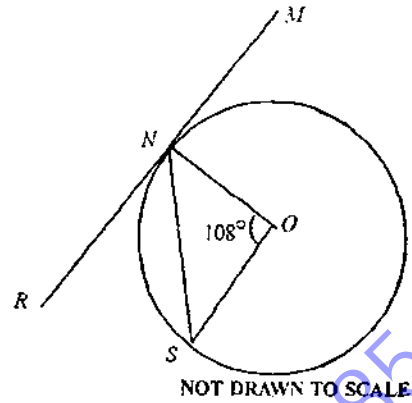
A. 86°

B. 70°

C. 51°

D. 42°

28. A boy 1.4 m tall, stood 10 m away from a tree of height 12 m. Calculate, correct to the **nearest** degree, the angle of elevation of the top of the tree from the boy's eyes.

A. 71°

B. 47°

C. 19°

D. 8°

29. Given that $\sin(5x - 28)° = \cos(3x - 50)°$, $0° \le x \le 90°$, find the value of x.

A. 39

B. 32

C. 21

D. 14

NOT DRAWN TO SCALE

In the diagram, MNR is a tangent to the circle centre O at N and $\angle NOS = 108°$. *Use the information to answer questions 30 and 31.*

30. Find $\angle OSN$.

A. 72°

B. 42°

C. 36°

D. 18°

31. Find $\angle SNR$.

A. 36°

B. 42°

C. 54°

D. 72°

32. Mrs Gabriel is pregnant. The probability that she will give birth to a girl is $\frac{1}{2}$ and the probability that the baby will have blue eyes is $\frac{1}{4}$. What is the probability that she will give birth to a girl with blue eyes?
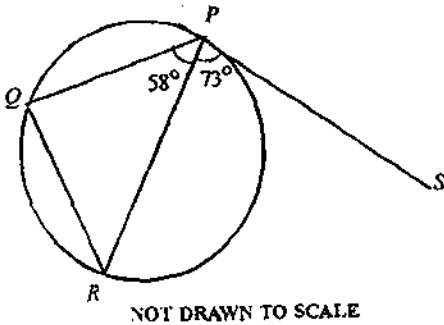
A. 1

D. $\frac{}{4}$

33. The mean of a set of 10 numbers is 56. If the mean of the first nine numbers is 55, find the 10th number.
- A. 75
- B. 65
- C. 55
- D. 45

34. Simplify: $\dfrac{2-18m^2}{1+3m}$.

- A. $2(1+3m)$
- B. $2(1+3m^2)$
- C. $2(1-3m)$
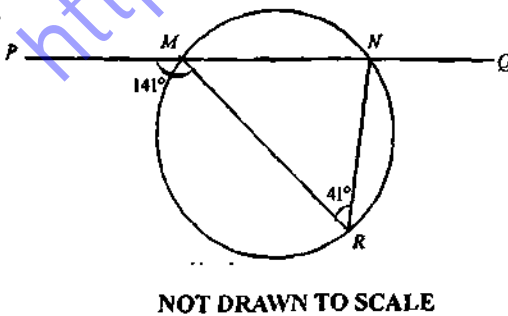- D. $2(1-3m^2)$

35.

NOT DRAWN TO SCALE

The diagram shows triangle PQR inscribed in a circle. $\overline{PS}$ is a tangent to the circle at P.

Find $\angle PRQ$.
- A. $49°$
- B. $58°$
- C. $73°$
- D. $131°$

36.

NOT DRAWN TO SCALE

In the diagram, triangle MNR is inscribed in circle MNR and $\overline{PQ}$ is a straight line. If $\angle MRN = 41°$ and $\angle PMR = 141°$, find $\angle QNR$.

- A. $39°$
- B. $80°$
- C. $110°$
- D. $141°$

37. Solve: $\dfrac{y+2}{4} - \dfrac{y-1}{3} > 1$.

- A. $y < -10$
- B. $y < -2$
- C. $y < 2$
- D. $y < 10$

The ages (years) of some members in a singing group are: 12, 47, 49, 15, 43, 41, 13, 39, 43, 41 and 36. *Use the information to answer questions 38 and 39.*

38. Find the lower quartile.

- A. 12
- B. 13
- C. 15
- D. 20

39. Find the mean.

- A. 33.35
- B. 35.54
- C. 34.45
- D. 36.44

40. Find, correct to two decimal places, the volume of a sphere whose radius is 3 cm.
[Take $\pi = \dfrac{22}{7}$]
- A. $72.57 \ cm^3$
- B. $88.12 \ cm^3$
- C. $105.29 \ cm^3$
- D. $113.14 \ cm^3$

7

41. The lengths of the parallel sides of a trapezium are 9 *cm* and 12 *cm*. If the area of the trapezium is 105 *cm²*, find the perpendicular distance between the parallel sides.
    A. 5 *cm*
    B. 7 *cm*
    C. 10 *cm*
    D. 15 *cm*

42. Find the volume of a cone of radius 3.5 *cm* and vertical height 12 *cm*.
    [Take $\pi = \frac{22}{7}$]
    A. 15.5 *cm³*
    B. 21.0 *cm³*
    C. 142.0 *cm³*
    D. 154.0 *cm³*

43. A local community has two newspapers: *the Morning Times* and *the Evening Dispatch*. The Morning Times is read by 45 % of households and the Evening Dispatch by 60 %. If 20 % of the households read **both** papers, find the probability that a particular household reads **at least one** paper.
    A. 0.45
    B. 0.65
    C. 0.85
    D. 0.95

44. A rectangle has width $\frac{3}{4}$ *cm* and an area $3\frac{3}{8}$ *cm²*. Find the length.
    A. 6 *cm*
    B. $4\frac{1}{2}$ *cm*
    C. $2\frac{5}{8}$ *cm*
    D. 12 *cm*

45. The mean of two numbers x and y is 4. Find the mean of the four numbers x, $2x$, y and $2y$.
    A. 2
    B. 4
    C. 6
    D. 8

46. The straight line $y = mx - 4$ passes through the point $(-4, 16)$. Calculate the gradient of the line.
    A. -5
    B. -3
    C. 3
    D. 5

47. If the equations $x^2 - 5x + 6 = 0$ and $x^2 + px + 6 = 0$ have common roots, find the value of p.
    A. 5
    B. 6
    C. -6
    D. -5

48. A trader made a loss of 15 % when an article was sold. Find the ratio of the selling price to the cost price.
    A. 3 : 20
    B. 3 : 17
    C. 17 : 20
    D. 20 : 23

49. Given that $\log_3 27 = 2x + 1$, find the value of x.
    A. 0
    B. 1
    C. 2
    D. 3

50. Solve: $6x^2 = 5x - 1$.
    A. $x = 2, 3$
    B. $x = 0, 3$
    C. $x = \frac{1}{2}, \frac{1}{3}$
    D. $x = \frac{1}{2}, -\frac{1}{3}$

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Section A
[40 marks]
Answer all the questions in this section
All questions carry equal marks

1. (a) Given that $(7 - 2x)$, 9, $(5x + 17)$ are consecutive terms of a Geometric with common ratio, r > 0, find the values of x.
    (b) Two positive numbers are in the ratio 3 : 4. The sum of thrice the first number and twice the second 68. Find the smaller number

2. Given that $y = \left[\frac{pr}{m} - p^2 r\right]^{\frac{-3}{2}}$
    (a) make r the subject;
    (b) find the value of r when y= -, m = 1 and p = 3.

3. A chord subtends angle of 72° at the centre of the circle of radius 24.5m. Calculate the perimeter of the minor segment [Take π = $\frac{22}{7}$]
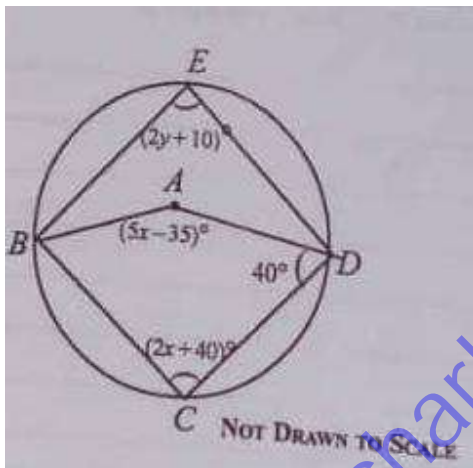
4. In the diagram, BCDE is a circle with centre A. $\angle BCDE = (2x + 40)°$, $\angle BAD = (5x - 35)°$, $\angle BED = (2y + 10)°$ and $\angle ADC = 40°$. Find:
    (a) the value of x and y.
    (b) $\angle ABC$

5 (a) Given that m = tan 30° and n = tan 45°, simplify, without using calculator, $\frac{m-n}{mn}$ leaving the answer in the form p + $\sqrt{q}$
    (b) There are 20 women in a bus 15 of them wear glasses and 10 wear wrist watches. If a woman is chosen at random from the bus, find the probability that she wears both glasses and wrist watch.
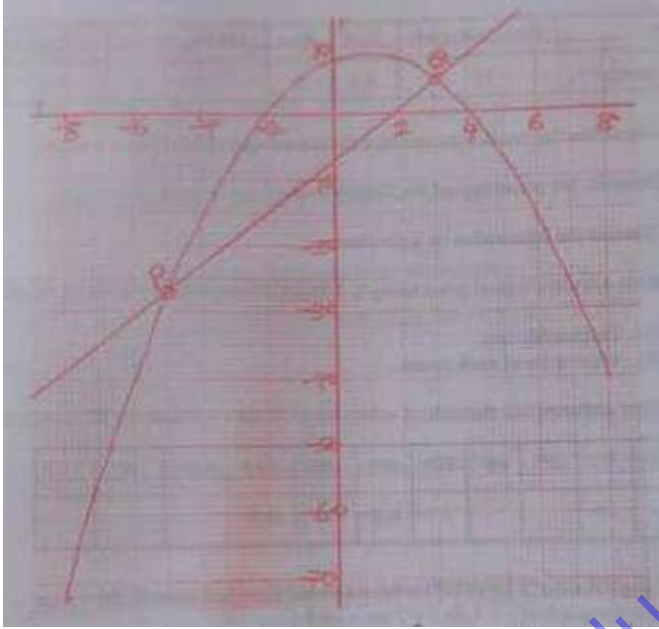
SECTION B
[60 MARKS]
Answer five question only from this section
All questions carry equal marks

The graph shows the relation of the form y = mx^2 + mx + r, where m, n, and r are constants

Using the graph:
(a)   state the scale used on both axes
(b)   find the values of m, n, and r
(c)   find the gradient of the line through P and Q:
(d)   state the range of values of x for which r > 0

7.   (a)   A man purchased 180 copies of a book at N250.00 each. He sold y copies at
              N300.00 each and the rest at a discount of 5 kobo in the naira of the cost price. If
              he made a profit of N7, 1125.00, find the value of y.
      (b)   A trader bought x bags of rice at a cost, c-24 x + 103 and sold them at a price, $x =$
              $33x - \frac{x^3}{20}$.
      (i)   Find the expression for the profit
      (ii)   If 20 bags of rice were sold, calculate the percentage profit

8.

Item	Food and drinks	Fuel	Rent	Building project	Education	saving
Percentage (%)	35	7.5	10	15	17.5	x

The table shows the monthly expenditure (in percentage) of Mr. Okafor's salary
(a)   Calculate the percentage of Mr. Okafor's salary
(b)   Illustrate the information on a pie chart
(c)   If Mr. Okafor's annual gross salary is $28,800.00 and he pays tax of 12%, calculate;
    (i)   his monthly tax
    (ii)   amount saved each month

9.   (a)   Copy and complete the table of values for y = 3 sin x + 7 cos x for $0° \leq x \geq 180°$

x	0°	20°	40°	60°	80°	100°	120°	140°	160°	180°
y	7.0				4.2		-0.9			

    (b)   Using a scale of 2 cm to 20° on the axis and 2 cm to 2 units on the y-axis,
        draw the graph of y = 3 sin x + 7 cos x for $0 \leq x \leq 180°$.
    (c)   Using the graph, find the;
        (i)   value of y when $x = 150°$
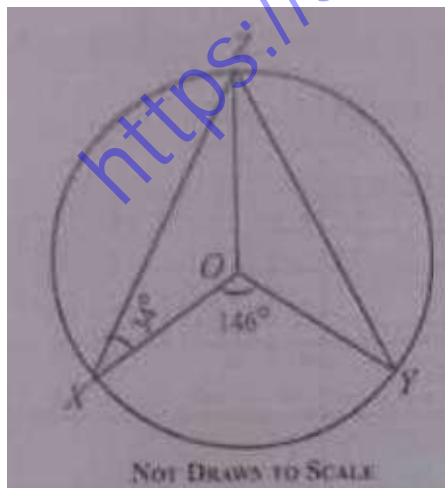   (ii)   range of values of x for which $y > 0$

10.

Age (years)	3	4	5	6	7	8	9	10
Number of children	2	6	5	x	6	9	8	5

The table shows the distribution of age of a number of children in a school;. If the
mean of the distribution is 7, find the;
(i)   value of x;
(ii)   standard deviation of their ages.

11.   (a)   The exterior angles of a polygon are 42°, 38°, 57°, $x°$, $(x + y)°$, $(2x − 15)°$ and $3x − y)°$.
        If x is less than y, find the values of x and y.

(b)

NOT DRAWN TO SCALE

In the diagram, O is the centre of the circle $XYZ \angle ZXO = 34°$ and $\angle XOY = 146°.$ Find $\angle OYZ.$

12.   (a)   The probability that an athlete will not win any of the three races is $\frac{1}{4}$.
           If the athlete runs in all the races, what is the probability that the athlete will win:
           (i)   only the second race;
           (ii)   all the three races;
           (iii)   only two of the races?
      (b)   A cone with perpendicular height 24 cm has a volume of 100 cm³. Find the volume
           of a cone with the same base radius and height 84 cm. [Take $\pi = \frac{22}{7}$]

13.   (a)   The diameter of a cylinder closed at both ends is 7 cm. If the total surface area is
           209 cm², calculate the height [Take $\pi = \frac{22}{7}$]
      (b)   The point X and Y, 19 m apart are on the same side of a tree. The angles of
           elevation of the top, T of the tree from X and Y on the horizontal ground with the
           foot of the tree are 43° and 38° respectively.
           (i)   Illustrate the information in a diagram.
           (ii)   Find, correct to one decimal place, the height of the tree.

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