Preppy Series

CORE MATHEMATICS

for Senior High Schools

WASSCE Past Questions & Solutions

Arranged by Year

preppyonline.org

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Compiled by

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Sample Edition

Preface

This book is designed to be a helpful resource for senior high school students, especially those preparing for the West African Senior School Certificate Examination (WASSCE) of the West African Examinations Council (WAEC).

It features

- a collection of complete WASSCE Core/General Mathematics past papers—both objective and essay-type questions—arranged by year
- detailed and thoughtfully explained solutions
- short notes on important facts and methods frequently used on the exams

Our philosophy is simple: learning Mathematics should go beyond memorizing procedures or blindly applying algorithms and tricks. True understanding comes from engaging with problems, exploring different approaches, and appreciating how and why solutions work. For this reason, each solution is presented

- in a step by step fashion
- with clear reasoning
- with multiple perspectives where appropriate
- and with an emphasis on building strong conceptual foundations

Special attention has been given to clarity, with well-drawn diagrams and structured workings that carry the student along through the solution process.

This free sample is available at preppyonline.org. The full version, including complete detailed solutions for both objective and essay-type questions, is available for purchase from the same website.

It is our hope that students, teachers, and independent learners alike will find it useful not just for exam preparation, but for developing confidence and deeper insight into Mathematics.

Comments, suggestions, and other enquiries may be sent to preppyonline@gmail.com

Contents

Chapter 1

2026 Paper 1

1. A cylindrical flask of radius 6 cm and height 12 cm has a hemispherical cover. What is the total volume of the flask.

A. 576π cm^3

B. 720π cm^3

C. 216π cm^3

D. 108π cm^3

2. The sum of three consecutive positive integers is 87. Find the **largest** of the integers.

A. 29

B. 28

C. 30

D. 31

3. Given that $\frac{p}{k} = \frac{dt}{r+k}$, make k the subject.

A. $k = \frac{pr}{dt+k}$

B. $k = \frac{dt+p}{pr}$

C. $k = \frac{pr}{dt-p}$

D. $k = \frac{dt-p}{pr}$

4. The exterior angles of a polygon are $(2x)°$, $(3x)°$, $(3x)°$, $(2x)°$ and $(5x)°$. Find the value of x.

A. 30

B. 15

C. 36

D. 24

5. The mean age of six children whose ages are $4, 6, 7, x, 10$ and 12 is 8 years. Find the standard deviation.

A. 2.83

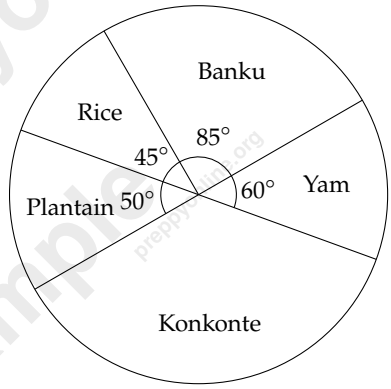
B. 2.65

C. 2.94

D. 3.11

The pie chart shows the distribution of the favourite meal of 600 students in a school.

Use the information to answer questions 6 and 7.



NOT DRAWN TO SCALE

6. How many students have Konkonte as their favourite meal?

A. 240

B. 400

C. 200

D. 120

7. What percentage of the students have rice as their favourite meal?

A. 37.50%

B. 43.75%

C. 18.75%

D. 12.50%

8. Alieu, Bonsu and Charles share \$170.00 in the ratio $19 : 27 : 37$ respectively. How much more does Bonsu get than Alieu?

A. \$16.39

B. \$20.00

C. \$38.00

D. \$36.39

9. Evaluate: 92 (modulo 5).

A. 3

B. 1

C. 4

D. 2

10. Form the quadratic equation whose roots are −8 and 7.

A. $x^2 + x - 56 = 0$

B. $x^2 + x + 56 = 0$

C. $x^2 - x + 56 = 0$

D. $x^2 - x - 56 = 0$

11. If $\log_2(5x - 2) - \log_2(2x - 5) = 2$, find the value of x.

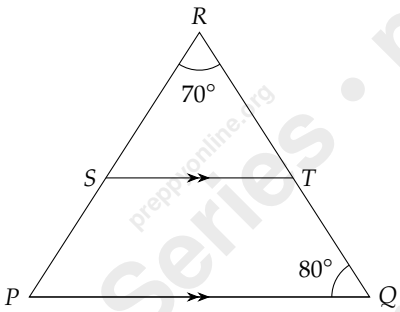
A. 5

B. 4

C. 6

D. 8

12.



NOT DRAWN TO SCALE

In the diagram PQR is a triangle with $\overline{ST} \parallel \overline{PQ}$, $\angle RQP = 80°$ and $\angle QRP = 70°$. Find $\angle RST$.

A. 70°

B. 80°

C. 55°

D. 30°

13. Arrange $\frac{1}{4}, \frac{2}{3}, \frac{5}{6}, \frac{3}{5}$ in ascending order.

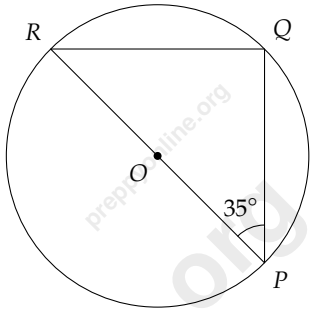
A. $\frac{2}{3}, \frac{1}{4}, \frac{5}{6}, \frac{3}{5}$

B. $\frac{1}{4}, \frac{5}{6}, \frac{3}{5}, \frac{2}{3}$

C. $\frac{1}{4}, \frac{3}{5}, \frac{2}{3}, \frac{5}{6}$

D. $\frac{1}{4}, \frac{2}{3}, \frac{5}{6}, \frac{3}{5}$

14.



NOT DRAWN TO SCALE

In the diagram, PQR is a circle with centre O. $\overline{PR}$ is a diameter and $\angle RPQ = 35°$. Find $\angle PRQ$.

A. 35°

B. 90°

C. 65°

D. 55°

15. Solve: $(0.0025)^{x+1} = \left(\frac{400}{8000}\right)^x$.

A. $x = 0$

B. $x = 1$

C. $x = -2$

D. $x = -1$

16. What number should be added to the expression $4x^2 - 20x + 18$ to make it a perfect square?

A. 5

B. −5

C. −7

D. 7

17. The equation of a line MN is $10y - 3x = 8$. Find the gradient.

A. $\frac{-10}{3}$

B. $\frac{10}{3}$

C. $\frac{-3}{10}$

D. $\frac{3}{10}$

18. The image of x under the mapping $x \to 2x + 3$ is 3. Find the value of x.

A. 3

B. 9

C. 0

D. −3

19. From the top of a building 125 m high, the angle of depression of an object is 22°. The foot of the building and the object are on the same horizontal. Find, correct to the **nearest** whole number, the distance of the object from the foot of the building.

A. 309 m

B. 259 m

C. 229 m

D. 349 m

20. Given that $\cos k = \frac{4}{5}$, where k is acute, find the value of $(\tan k - \sin k)$.

A. $\frac{7}{20}$

B. $\frac{3}{20}$

C. $\frac{11}{20}$

D. $\frac{13}{20}$

21. It takes 3 technicians 8 days to install 36 solar panels in a factory. How many working days will it take 4 technicians to install the same number of solar panels in the same factory, working at the same rate?

A. 4 days

B. 3 days

C. 5 days

D. 6 days

22. Consider the statements:

p: There is no Chief who is not wise;

q: Every Baba is a chief.

Which of the following statements is a valid conclusion from p and q?

A. Every wise person is a Baba.

B. Every wise person is a Chief.

C. Every Baba is wise.

D. Every Chief is Baba.

23. Find the interior angle of a 12-sided regular polygon.

A. 60°

B. 30°

C. 150°

D. 210°

24. Solve: $\frac{x-1}{2} + 3x = 10$.

A. $x = 4.25$

B. $x = 3$

C. $x = 2$

D. $x = 5.25$

25. The bearing of P from Q is 162°. What is the bearing of Q from P?

A. 342°

B. 322°

C. 018°

D. 248°

26. A bag contains 5 red, 3 green and 2 blue balls all of the same size. If a ball is picked at random, what is the probability that it is **either** red **or** blue?

A. 0.7

B. 0.8

C. 0.5

D. 0.6

27. A learner compares two data sets i.e. X and Y, both having the same mean. X has a standard deviation 0.95 and Y has a standard deviation 0.55. What does this imply about the distribution of X and Y?

A. X has values **more** spread out from the mean compared to Y.

B. X has **more** values closer to mean compared to Y.

C. Both X and Y are **identically** distributed.

D. X has **no** variation in values.

28. A variable F varies directly as the square root of L and inversely as the square root of T. Given that $F = 2.1$ when $L = 9$ and $T = 25$, express L in terms of F and T.

A. $L = \frac{4TF^2}{49}$

B. $L = \frac{49F^2}{T}$

C. $L = \frac{4T}{49F^2}$

D. $L = \frac{49T}{4F^2}$

29. A car depreciates in value at a rate of 20% each year. If the value of the car is \$25,000.00, find the value after 3 years.

A. \$12,800.00

B. \$12,000.00

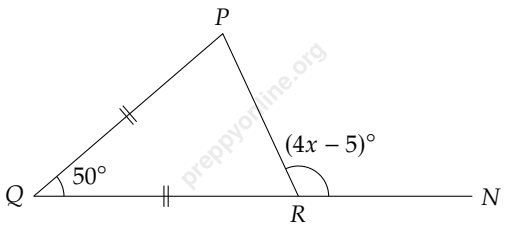
C. \$15,625.00

D. \$16,000.00

30. By how much is the sum of $3x$, $(6x - 5)$, $9x$ and $(4x + 1)$ less than $30x$?

A. $8x - 4$
B. $8x + 4$
C. $4x - 8$
D. $4x + 8$

31.



NOT DRAWN TO SCALE

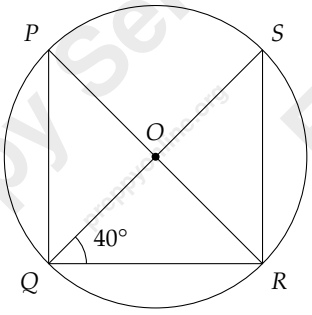
In the diagram, $|PQ| = |QR|$, $\angle PQR = 50°$ and $\angle PRN = (4x - 5)°$. Find the value of x.

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

32. Given that $4x - 2y = 1$ and $3x - 4y = -0.5$, find the value of $(x + y)$.

A. 0.25
B. -1
C. 1
D. 2

33.



NOT DRAWN TO SCALE

In the diagram, $PQRS$ is a circle with centre O and $\angle RQS = 40°$. Find $\angle PRS$.

A. 50°
B. 40°
C. 90°
D. 45°

34. In a class, there are 20 boys and 15 girls. Two are selected at random one after the other **without replacement** from the class. What is the probability that they are both boys or both girls?

A. $\frac{59}{119}$
B. $\frac{57}{119}$
C. $\frac{63}{119}$
D. $\frac{67}{119}$

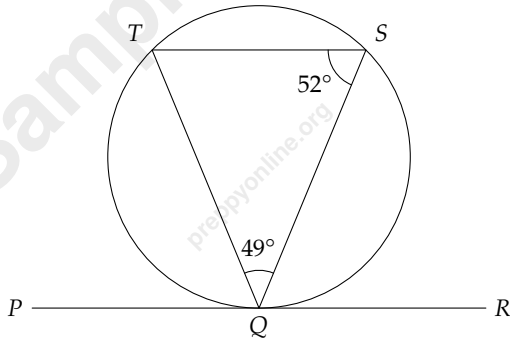
35. The height of an equilateral triangle is $\sqrt{3}$ cm. Find the perimeter of the triangle.

A. 3 cm
B. 2 cm
C. 6 cm
D. $3\sqrt{3}$ cm

36. When the sum of 84 and a certain number is divided by 3, the result is five times the number. Find the number.

A. 6
B. 4
C. 8
D. 10

37.



NOT DRAWN TO SCALE

In the diagram, $\overline{PR}$ is a tangent to the circle at Q, $\angle TQS = 49°$ and $\angle TSQ = 52°$. Find $\angle SQR$.

A. 52°
B. 90°
C. 79°
D. 49°

38. The **fifth** term of a Geometric Progression is 16 times the **third** term. Find the positive value of the common ratio.

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

39. Find the distance between $P(6, -5)$ and $Q(-2, 1)$.

A. 10 units

B. 5 units

C. 15 units

D. 20 units

40. In an examination, 32 candidates passed Economics while 36 passed Government. If 18 candidates passed **both** subjects and 10 failed **both** subjects, how many candidates sat for the examination?

A. 60

B. 86

C. 58

D. 40

41. Find the value(s) of x for which $\frac{2+x}{x-3}$ is not defined.

A. 3

B. -3

C. $-3, 2$

D. $-2, 3$

42. Factorize: $35 - 2b - b^2$.

A. $(7+b)(5-b)$

B. $(35-2b)(b-1)$

C. $(3+7b)(5-b)$

D. $(35-b)(3b+7)$

43. The scores obtained by some learners are: $23, 27, 27, 32, 35, 36$ and 52. Find the range.

A. 32

B. 29

C. 23

D. 33

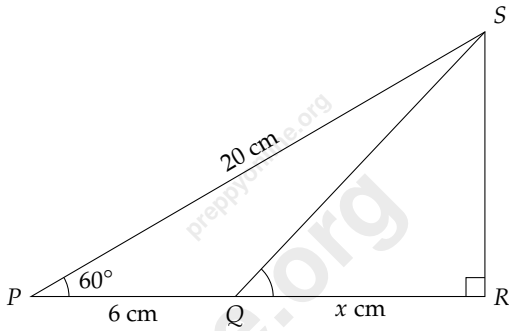
44. A man gives \$7,800.00 to be shared among his three sons and two daughters. The sons receive equal shares of the amount and each daughter receives **two-thirds** of what a son received. How much did **each** son receive?

A. \$5,400.00

B. \$1,800.00

C. \$5,000.00

D. \$2,500.00



NOT DRAWN TO SCALE

In the diagram, $|PS| = 20$ cm, $|PQ| = 6$ cm, $|QR| = x$ cm and $\angle SPR = 60°$.

Use this information to answer questions 45 and 46.

45. Find the value of x.

A. 4

B. 6

C. 10

D. 13

46. Find $|SR|$.

A. 22.4 cm

B. 17.3 cm

C. 19.6 cm

D. 19.1 cm

47. Simplify $\frac{4-x^2}{2x-x^2}$, where $x \neq 0, 2$.

A. $\frac{2-x}{x}$

B. $\frac{2+x}{x}$

C. $\frac{2}{x}$

D. $\frac{x-2}{x}$

48. Solve: $53_x = 1121_{\text{three}}$.

A. $x = 7$

B. $x = 6$

C. $x = 8$

D. $x = 9$

49. A rectangle 10 cm by 9 cm is equal in area to a triangle. If the height of the triangle is 15 cm, find the length of the base.

A. 12 cm

B. 6 cm

C. 14 cm

D. 15 cm

50. Find the truth set of $\frac{1}{2}(3x - 5) < 3x + 2$.

A. $\{x : x < -3\}$
B. $\{x : x > -3\}$
C. $\{x : x > -1\}$
D. $\{x : x > 3\}$

Chapter 2

Solutions to 2026 Paper 1

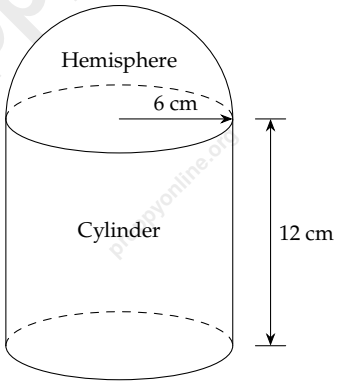
Answer key

1. A	11. C	21. D	31. B	41. A
2. C	12. D	22. C	32. C	42. A
3. C	13. C	23. C	33. A	43. B
4. D	14. D	24. B	34. A	44. B
5. B	15. C	25. A	35. C	45. A
6. C	16. D	26. A	36. A	46. B
7. D	17. D	27. A	37. C	47. B
8. A	18. C	28. A	38. B	48. C
9. D	19. A	29. A	39. A	49. A
10. A	20. B	30. B	40. A	50. B

Solutions

1. Answer: A

Below is a sketch of the flask showing the cylindrical base and the hemispherical cap.



The total volume of the flask is the sum of the volumes of the cylindrical base and the hemispherical cover.

The volume of the cylindrical base is given by (Section 5.9.3)

$$\pi r^2 h$$

Since the radius is 6 cm and the height is 12 cm, this volume evaluates to

$$\pi \times 6^2 \times 12 = 432\pi \text{ cm}^3$$

Since the hemispherical cover is half of a sphere, its volume is given by half the volume of a sphere (Section 5.9.3):

$$\frac{1}{2} \times \frac{4}{3}\pi r^3 = \frac{2}{3}\pi r^3$$

Substituting $r = 6$ cm into the formula gives the volume of the hemispherical cover as

$$\frac{2}{3}\pi \times 6^3 = 144\pi \text{ cm}^3$$

Adding up the two volumes gives the total volume of the flask as

$$432\pi \text{ cm}^3 + 144\pi \text{ cm}^3 = 576\pi \text{ cm}^3$$

2. Answer: C

Consecutive integers are integers that follow after one another. For example, 1, 2, and 3 are three consecutive integers. So are 5, 6, and 7.

If the first among the three consecutive integers is n, then the second one will be $n + 1$, and the third one will be $n + 2$. Then the sum of the three integers will be

$$n + (n + 1) + (n + 2) = n + n + 1 + n + 2 = 3n + 3$$

Since the sum of the three integers is 87, we have

$$\begin{aligned} 3n + 3 &= 87 \\ 3n &= 87 - 3 = 84 \\ n &= \frac{84}{3} = 28 \end{aligned}$$

Thus, the first or the smallest among the three integers is 28. The one after that is 29, and the one after that, which is the largest, is 30.

3. Answer: C

To make k the subject of the given equation, we cross-multiply and simplify to get

$$\begin{aligned} \frac{p}{k} &= \frac{dt}{r+k} \\ p(r+k) &= kdt \\ pr + pk &= kdt \\ pk - kdt &= -pr \\ k(p-dt) &= -pr \\ k &= \frac{-pr}{p-dt} \end{aligned}$$

Looking at the answer options given, they all do not have a minus sign in the numerator so we will get rid of the minus sign in the numerator by multiplying both the numerator and the denominator of the fraction by -1. Doing this does not change the answer because $\frac{-1}{-1} = 1$ and multiplying a number by 1 does not change it:

$$\begin{aligned} k &= \frac{-pr}{p-dt} \\ k &= \frac{-pr}{p-dt} \times \frac{-1}{-1} \\ k &= \frac{pr}{dt-p} \end{aligned}$$

4. Answer: D

The sum of the exterior angles of any polygon is 360° (Section 5.19.3).

Hence,

$$\begin{aligned} 2x + 3x + 3x + 2x + 5x &= 360 \\ 15x &= 360 \\ x &= \frac{360}{15} = 24 \end{aligned}$$

5. Answer: B

To find the standard deviation of the ages, we need to first find the missing age, x.

Since the mean of the ages is the sum of the ages divided by how many ages there are, we can write

$$\frac{4+6+7+x+10+12}{6} = 8$$

Solving this equation gives

$$\begin{aligned} \frac{39+x}{6} &= 8 \\ 39 + x &= 6 \times 8 = 48 \\ x &= 48 - 39 = 9 \end{aligned}$$

Having found the missing age, we can now find the standard deviation.

We will use two formulae for standard deviation to compare how much work is involved in each. Which of the two formulae do you think is better?

Method 1: Using the formula $\sigma = \sqrt{\frac{\sum(x-\bar{x})^2}{n}}$

It is helpful to present the required information in a table.

Age (x)	$x - \bar{x}$	$(x-\bar{x})^2$
4	−4	16
6	−2	4
7	−1	1
9	1	1
10	2	4
12	4	16
		$\sum(x-\bar{x})^2 = 42$

Using the formula for variance, we get the variance of the data as

$$\text{variance} = \frac{\sum(x-\bar{x})^2}{n} = \frac{42}{6} = 7$$

Since the standard deviation is the square root of the variance, we get the standard deviation of the data as

$$\begin{aligned} \text{standard deviation} &= \sqrt{\text{variance}} \\ &= \sqrt{7} \\ &= 2.65 \text{ to 2 decimal places} \end{aligned}$$

Chapter 3

2026 Paper 2

Section A

40 marks

Answer **all** the questions in this section. All questions carry **equal** marks.

1. A jet which flies at an average speed of 850 km/h consumes 5,000 litres of fuel per hour.

(a) If the jet covered a distance of 3,400 km, determine the quantity of fuel consumed.

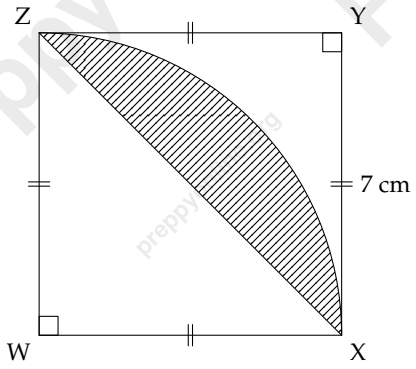
(b) Find the average speed required to reduce the fuel consumption by 10%. [*Assume that fuel consumption is proportional to speed*]

2. A group of engineers completed **three-eighths** of a project in 6 days, working at the same rate.

(a) How long will it take the group to complete the entire project?

(b) If another group joins them and speeds up the remaining work by 50%, find the time that would be saved.

3.



NOT DRAWN TO SCALE

In the diagram, $WXYZ$ is a square of length 7 cm. Calculate, correct to **three** significant figures, the area of the shaded region. [Take $\pi = \frac{22}{7}$]

4. Given that $\frac{10^x + 14^x}{15^x + 21^x} = 2\frac{1}{4}$, find the value of x.

5. Atakrom, Obokrom and Maakrom are communities in a district. The probability that it will rain in Atakrom is $\frac{3}{4}$. The probability that it will rain in Obokrom is **two-thirds** the probability of raining in Atakrom. The probability that it will rain in Maakrom is **half** the probability of raining in Obokrom.

(a) Find the probability of raining in:

(i) Obokrom;

(ii) Maakrom.

(b) Calculate the probability that it will:

(i) rain in **all** communities;

(ii) **not** rain in any of the communities

Section B

60 marks

Answer **five** questions **only** from this section. All questions carry **equal** marks.

6. Mr. Ayensu walks from his house to a bus stop in 80 equal steps while his daughter Emefa walks from the bus stop to her school in 75 equal steps. The total distance between the school and the bus stop is 40 metres. Emefa's steps are **two-thirds** the length of her father's steps.

(a) Find, **in metres**, the distance covered by Mr. Ayensu.

(b) If Mr. Ayensu takes 45 seconds to reach the bus stop, calculate in km/h his average walking speed.

7. A company produces handmade bags at \$120.00 and sells each at 30% profit.

(a) Find the selling price of a bag.

(b) If the company wants to make a total profit of \$2,700.00, how many bags must be sold?

(c) Suppose the production cost increases by 10% but the selling price remains unchanged find the:

(i) new profit per bag;

(ii) number of bags that must be sold to make a profit of at least \$2,700.00.

8. Three towns $A(K° \text{ S}, 20° \text{ W})$, $B(K° \text{ S}, 0°)$ and $C(15° \text{ N}, 0°)$ are on the surface of the earth. The shortest distance between B and C is 2,560 km.

(a) Illustrate the information in a diagram.

(b) Find, correct to:

(i) the **nearest** degree, the value of K;

(ii) **one** decimal place, the shortest distance from A to B;

(iii) the **nearest** hour, the time taken for an aeroplane to fly from B to C at 800 km/h.

[Take $\pi = \frac{22}{7}$, $R = 6,400$ km]

9. On a certain day, two shows of a movie premiere was aired. The cost of tickets for the first show was GH¢ x each and the total receipts from the tickets was GH¢ 45,000.00. In the second show, the price of each ticket was reduced by GH¢ 5.00 resulting in 300 more tickets being sold. This increased the total receipts by GH¢ 9,000.00. Find the:

(a) price of a ticket for the first show;

(b) number of tickets sold in the first show.

10. (a) A line cuts the y-axis at $(0, -3)$ and the x-axis at $(3, 0)$. Write in the form $y = mx + c$, the equation of the line.

(b) Two spheres have their surface areas in the ratio 16 : 25. The volume of the smaller sphere is 48 cm^3. Find the:

(i) volume of the bigger sphere;

(ii) radius of the bigger sphere.

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

11. (a) Denkyemkrom is 35 km from Seidukrom on a bearing of 050°. Kyekyekrom is 12 km from Seidukrom on a bearing of 140°.

(i) Illustrate the information in a diagram.

(ii) Find the:

(I) distance between Denkyemkrom and Kyekyekrom;

(II) bearing of Seidukrom from Kyekyekrom.

(b) Solve: $\dfrac{x}{x+1} - \dfrac{x+1}{3x-1} = \dfrac{1}{4}$.

12. The ages, in years of six students arranged in order of magnitude are $(2x + 1), (4x - 1), 5x, m, n$ and r. If their ages form an Arithmetic Progression, calculate the:

(a) ages of the students;

(b) standard deviation.

13. (a) Using a ruler and a pair of compasses only:

(i) construct $\triangle ABC$ such that $|AB| = 8$ cm, $\angle BAC = 45°$ and $\angle ABC = 67.5°$;

(ii) locate the point, O, inside triangle ABC equidistant from A, B and C;

(iii) construct a circle with centre O, which passes through A.

(b) Measure $|OA|$.

Chapter 4

Solutions to 2026 Paper 2

Question 1

(a) We are given that the jet consumes 5,000 litres of fuel per hour. We are also given that the jet covered a distance of 3,400 km. We are asked to find the quantity of fuel consumed.

To find how much fuel the jet consumed, we first need to find how long it took the jet to cover the distance of 3,400 km. We can use the formula

$$\text{time} = \frac{\text{distance}}{\text{speed}}$$

Substituting the given values into the formula gives

$$\text{time} = \frac{3,400 \text{ km}}{850 \text{ km/h}} = 4 \text{ hours}$$

Now that we know the time it took the jet to cover the distance of 3,400 km, we can find the quantity of fuel consumed.

$$\text{fuel consumed} = \text{time} \times \text{fuel consumption per hr}$$

Since the jet consumes 5,000 litres of fuel per hour, we have

$$\begin{aligned}\text{fuel consumed} &= 4 \text{ hours} \times 5,000 \text{ litres/hour} \\ &= 20,000 \text{ litres}\end{aligned}$$

(b) Since fuel consumption is proportional to speed, we have

$$\text{fuel consumption} = k \times \text{speed}$$

where k is a constant.

Thus, to reduce fuel consumption by 10%, we need to reduce speed by 10%.

The average speed that achieves that is 100% − 10% = 90% of the original average speed. This is because the original speed is 100% of itself. So, reducing it by 10% leaves 90% of the original speed.

$$\begin{aligned}\text{new avg. speed} &= 90\% \text{ of original avg. speed} \\ &= \frac{90}{100} \times 850 \text{ km/h} \\ &= 765 \text{ km/h}\end{aligned}$$

Question 2

(a) There is a direct relationship between the amount of work done and the time it takes to complete it. That is, the more work done, the more time it takes to complete it and the less work done, the less time it takes to complete it.

Let x be the number of days it will take the group to complete the entire project.

Then, from the given information, we have the following equivalent ratios:

$$\frac{3}{8} \text{ of project} : 6 \text{ days} = 1 \text{ of project} : x \text{ days}$$

Writing the equivalent ratios as equivalent fractions, we have

$$\frac{\frac{3}{8}}{6} = \frac{1}{x}$$

Cross-multiplying and solving for x gives

$$\begin{aligned}\frac{3}{8}x &= 6 \times 1 \\ \frac{3}{8}x &= 6 \\ x &= 6 \times \frac{8}{3} \\ x &= 16\end{aligned}$$

Thus, it will take the group of engineers 16 days to complete the entire project.

(b) After the first group of engineers completed $\frac{3}{8}$ of the project, the amount of work remaining was

$$1 - \frac{3}{8} = \frac{8}{8} - \frac{3}{8} = \frac{5}{8} \text{ of the project}$$

The new group sped up the remaining work by 50%, so the new speed was 100% + 50% = 150% of the original speed.

Since the original group of engineers took 6 days to complete $\frac{3}{8}$ of the project, and they were going to use 16 days to complete the entirety of the project, they were going to use $16 - 6 = 10$ days to complete the remaining $\frac{5}{8}$ of the project.

If the new group added to the original group speeds up the work by 50%, how long are they going to take to complete the remaining $\frac{5}{8}$ of the project?

$$\begin{aligned} 100\% \text{ speed} &\quad\rightarrow\quad 10 \text{ days} \\ 150\% \text{ speed} &\quad\rightarrow\quad x \end{aligned}$$

There is an inverse relationship between the speed of work and the time it takes to complete it. Thus, the faster the speed of work, the less time it takes to do the work; and the slower the speed of work, the more time it takes to do the work. Hence, we can write the following equivalent fractions:

$$\frac{100\%}{150\%} = \frac{x}{10 \text{ days}}$$

Multiplying both sides by 10 gives

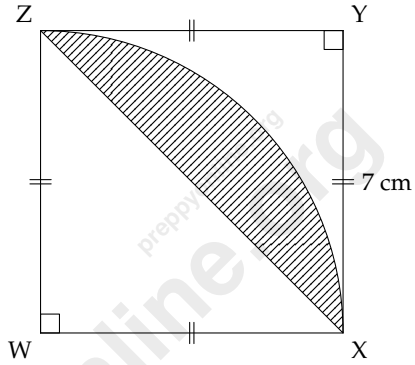
$$\begin{aligned} x &= \frac{100}{150} \times 10 \\ &= \frac{20}{3} \\ &= 6\frac{2}{3} \text{ days} \end{aligned}$$

Thus, when the speed is increased by 50%, it takes $6\frac{2}{3}$ days to complete the remaining $\frac{5}{8}$ of the project.

The time saved is the difference between the time it would have taken the original group to complete the remaining work and the time it takes the new group to complete the remaining work. That is,

$$\begin{aligned} \text{time saved} &= \text{original time for remaining work} \\ &\quad - \text{new time for remaining work} \\ &= 10 \text{ days} - 6\frac{2}{3} \text{ days} \\ &= 3\frac{1}{3} \text{ days} \end{aligned}$$

Question 3



The area of the shaded region is the difference between the area of a quarter circle (a sector with angle 90°) of radius 7 cm and the area of a triangle with base 7 cm and height 7 cm.

The area of the sector is

$$\begin{aligned} \frac{90^\circ}{360^\circ} \times \pi r^2 &= \frac{1}{4} \times \frac{22}{7} \times (7 \text{ cm})^2 \\ &= \frac{1}{4} \times \frac{22}{7} \times 7 \times 7 \text{ cm}^2 \\ &= \frac{77}{2} \text{ cm}^2 \end{aligned}$$

The area of the triangle is

$$\begin{aligned} \frac{1}{2} \times \text{base} \times \text{height} &= \frac{1}{2} \times 7 \text{ cm} \times 7 \text{ cm} \\ &= \frac{49}{2} \text{ cm}^2 \end{aligned}$$

Since the area of the shaded region is the difference between the area of the sector and the area of the triangle, we have

$$\begin{aligned} \text{area of shaded region} &= \frac{77}{2} \text{ cm}^2 - \frac{49}{2} \text{ cm}^2 \\ &= \frac{28}{2} \text{ cm}^2 \\ &= 14 \text{ cm}^2 \end{aligned}$$

Thus, the area of the shaded region, correct to three significant figures, is 14.0 cm^2.