BECE 2010
MATHEMATICS 2

ESSAY
1 hour

[60 marks]

Answer **four** *questions* **only** *from this section*

All working must be clearly shown.

The use of calculators is **not** *allowed*

Marks will **not** *be awarded for correct answers without corresponding working.*

All questions carry equal marks

1. (a) Factorize: $(m + n)(2x - y) - x(m + n)$

(b) A and B are subsets of a universal set

U = {1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18}

Such that A = {even numbers} and B = {multiples of 3}

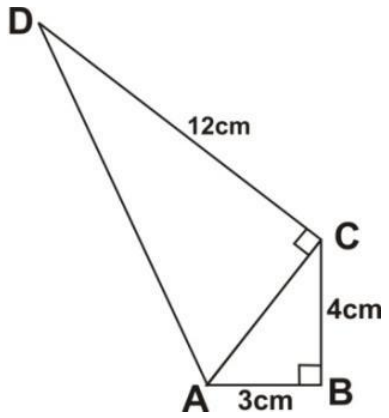
(i) List the elements of the sets A, B, (A∩B), (AUB) and (AUB)′

(ii) Illustrate the information in (i) on a Venn diagram

(c) Find the values of x and y in the vector equation

$$\begin{pmatrix} 5 \\ 3 \end{pmatrix} + 2\begin{pmatrix} x \\ y \end{pmatrix} - \begin{pmatrix} 1 \\ -7 \end{pmatrix} = 0$$

2. (a) Find the sum of 2,483.65, 701.532 and 102.7, giving your answer to one decimal place.



(b) In the quadrilateral ABCD above, |AB| = 3 cm, |BC| = 4 cm, |CD| = 12 cm and angle ABC = 90°. Calculate:

(i) the perimeter of ABCD

(ii) the area of ABCD

3. (a) Evaluate: $\frac{2^7 \times 3^4 \times 5^3}{2^3 \times 3^2 \times 5^2}$, leaving your answer in standard form.

(b) Kwame rode a bicycle for a distance of x km and walked for another ½ hour at a rate of 6 km/hour. If Kwame covered a total distance of 10 km, find the distance x he covered by bicycle.

(c) A rectangular tank of length 22 cm, width 9 cm and height 16 cm is filled with water. The water is poured into a cylindrical container of radius 6 cm. Calculate the :

(i) volume of the rectangular tank

(ii) depth of water in the cylindrical container.

[Take $\pi = {}^{22}/_{7}$]

4. (a) Simplify: $7\frac{2}{3} - 4\frac{5}{6} + 2\frac{3}{8}$

(b) The area of a trapezium is 31.5 cm^2. If the parallel sides are of lengths 7.3 cm and 5.3 cm, calculate the perpendicular distance between them.

(c) The marks scored by four students in a Mathematics test are as follows:

Esi - 92

Seth - 85

Mary - 65

Efe - x

(i) Write down an expression for the mean (average) of the marks.

(ii) If the mean is less than 80, write a linear inequality for the information

(iii) Find the possible marks Efe scored in the test. Represent your answer on the number line.

5. (a) Solve: $\frac{4x-3}{2} = \frac{8x-10}{8} + 2\frac{3}{4}$

(b) Using a scale of 2 cm to 1 unit on both axes, draw two perpendicular lines OX and OY on a graph sheet for the x – axis from -5 to 5 and the y – axis from -6 to 6.

(i) Plot the points A(2, 3) and B(-3, 4) and join them with a long straight line

(ii) Plot on the same graph sheet, the points C(4, 2) and D(-2, -3) and join them with a long straight line to meet the line through AB

(iii) Measure the angle between the lines through AB and CD.

(iv) Find the coordinates of the point at which the lines through AB and CD meet.

6. The table below shows the frequency distribution of the number of letters in the surnames of some students in a school.

No. of letters	4	5	6	7	8	9	10
No. of students	7	3	2	8	5	3	1

(a) From the distribution, determine

(i) the mode

(ii) the mean

(b) If a student is selected at random, find the probability that his/ her name will contain more than 7 letters.

(c) Draw a bar chart for the distribution.

MATHEMATICS 1

OBJECTIVE TEST
1 hour

1. Which of the following sets is well defined?
   - A. {Man, Kofi, Red, 14}
   - B. {Ink, Mango, Green, Nail}
   - C. {Car, Road, Glass, Book}
   - D. {Seth, Mary, Jacob, Evelyn}

2. If set B is a subset of set A, then
   - A) sets A and B have the same number of elements
   - B) some members of set B can be found in set A
   - C) no member of set B is in set A
   - D) all the members of set B are in set A

3. The leastcommon multiple (LCM) of 16, 30 and 36 is

   A) 3 B) 6 C) 240 D) 720

4. The sum of 5 and x divided by 4 is equal to 3.25. Find the value of x.

   A) 8 B) 7 C) 2¼ D) $-3\frac{4}{13}$

5. The numbers 32, 33, 34, …, …, 42 form a sequence in base 5.

   Find the missing numbers

   A) 35, 36 B) 30, 31 C) 40, 41 D) 31, 41

6. Write down all the integers in the set A = {-10, -4, 0, ¼, 2½, 45, 100}

   A. {-10, -4, 0, 45, 100}

   B. {-10, - 4}

   C. {0, 45, 100}

   D. {¼, 2½}

7. Find the total cost of 25 pens and 75 books if each pen costs GH¢ 0.20 and each book costs GH¢ 0.30.

   A) GH¢22.50 B) GH¢23.50 C) GH¢27.50 D) GH¢50.00

8. Simplify - 27 + 18 – (10 – 14) – (-2)

   A) – 3 B) – 7 C) – 11 D) – 35

9. Arrange the following numbers from the lowest to the highest: 0.5, 3, -5, 0.

   A) 0, 0.5, -5, 3 B) 0, -5, 0.5, 3 C) -5, 0, 0.5, 3 D) -5, 0.5, 0, 3

10. Find howmany pieces of cloth 5½ m long that can be cut from a roll of cloth 121 m long.

    A) 665½ B) 115½ C) 66 D) 22

11. Find the value of 124.3 + 0.275 + 74.06, correcting your answer to one decimal place.

    A) 198.6 B) 198.7 C) 892.0 D) 892.4

12. Esi and Kwasi are 12 and 8 years old respectively. They share 60 mangoes in the ratio of their ages. How many mangoes does Esi get?

    A) 42 B) 40 C) 36 D) 18

13. It takes 6 students 1 hour to sweep their school compound. How long will it take 15 students to sweep the same compound?

    A) 24 minutes B) 12 minutes C) 3 hours D) 2 hours

14. A housing agent makes a commission of GH¢ 103,500 when he sells a house for GH¢ 690,000. Calculate the percentage of his commission.

    A) 15.0% B) 10.0% C) 7.5% D) 5.0%

15. A simple interest of GH¢ 37,500.00 is earned on an amount of GH¢ 500,000.00 for 3 years. Find the rate of interest per annum.

A) 20.0% B) 10.0% C) 5.0% D) 2.5%

16. Simplify: $(8x^2y^3)(\frac{3}{8}xy^4)$

A) $3x^3y^7$ B) $3x^2y^7$ C) $3x^3y^4$ D) $3xy$

17. The scores of 10 students in anexamination are given as follows:
45, 12, 75, 81, 54, 51, 24, 67, 19 and 39.

What is the median of the scores?

A) 39 B) 48 C) 51 D) 54

18. A pie chart is to be drawn from the data in the following table:

Cassava	20%
Yam	17%
Plantain	28%
Maize	35%

What will be the value of the angle of the sector for maize?

A) 126.0° B) 100.8° C) 72.0° D) 61.2°

19. Eighteen cards are numbered from 11 to 29. If one card is chosen at random, what is the probability that it contains the digit 2?

A) $\frac{3}{9}$ B) $\frac{7}{18}$ C) $\frac{5}{9}$ D) $\frac{11}{18}$

20. Find the value of x, if $\frac{x}{4} + 1 = 5$.

A) 24 B) 20 C) 19 D) 16

21. Factorize: $xy + 5x + 2y + 10$

A. $(x + 5)(2y + 10)$

B. $(x + 2)(y + 10)$

C. $(x + 5)(y + 2)$

D. $(x + 2)(y + 5)$

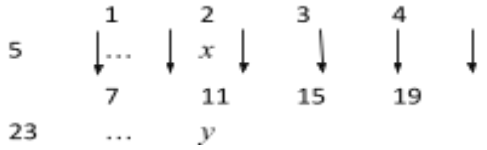
22. If $x \in \{2, 3, 4, 5\}$, find the truth set of $2x + 1 < 8$

A. {2,3,4} B. {2,3} C. {3,4} D. {4,5}

23. Solve the inequality: $7x - (10x + 3) \geq -9$

A) $x \geq 2$ B) $x \leq 4$ C) $x \geq 4$ D) $x \leq 2$

24. Find the rule of the mapping:



A) $x \rightarrow 4x-3$ B) $x \rightarrow 3-4x$ C) $x \rightarrow 4x+3$ D) $x \rightarrow 4x+5$

25. Find the circumference of a circle whose area is equal to $64\ \pi\ cm^2$.

A) $32\ \pi\ cm^2$ B) $16\ \pi\ cm^2$ C) $8\ \pi\ cm^2$ D) $4\ \pi\ cm^2$

26. Which of the following geometric figures is the plane shape of a cube?

A) Circle

B) Rectangle

C) Square

D) Triangle

27. How many lines of symmetry has a rectangle?

A) 4 B) 3 C) 2 D) 1

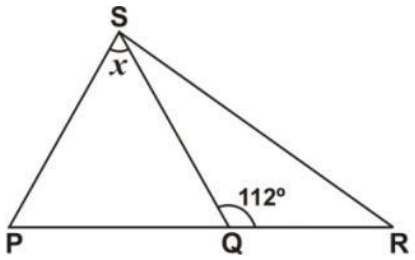
28. A rectangular box has length 20 cm, width 6 cm and height 4 cm. Find how many cubes of side 2 cm that will fit into the box.

A) 120 B) 60 C) 30 D) 15

29. The interior angle of a regular polygon is 120°. How many sides has this polygon?

A) 3 B) 4 C) 5 D) 6

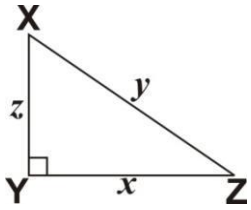
30.



In the diagram above, length of PS = length of SQ and angle SQR = 112°. Find the value of x.

A) 68° B) 56° C) 46° D) 44°

31. **XYZ** is a right-angled triangle with length of sides as shown.



Which of the following equations gives the value of z^2?

A) $z^2 = (x^2 + y^2)$

B) $z^2 = (x - y)$

C) $z^2 = (y^2 - x^2)$

D) $z^2 = (x^2 - y^2)$

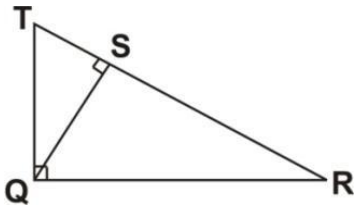
32. Express 7 min. 30 sec. as a percentage of 1 hour.

A) 2.5% B) 7.5% C) 11.7% D) 12.5%

33. The point (4,5) is translated to the point (3,1). What is the translation vector?

A. $\begin{pmatrix} -1 \\ 4 \end{pmatrix}$ B. $\begin{pmatrix} 1 \\ 4 \end{pmatrix}$ C. $\begin{pmatrix} 1 \\ -4 \end{pmatrix}$ D. $\begin{pmatrix} -1 \\ -4 \end{pmatrix}$

34. In the diagram below, triangle QRT is the enlargement of QST.



Which side of triangle QRT corresponds to side QT of triangle QST?

A) TS B) TR C) QR D) SR

35.

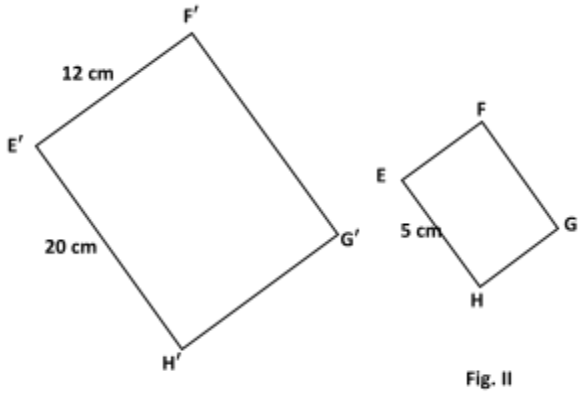


Fig. I Fig. II

Not drawn to scale

In the diagrams above Fig. I is an enlargement of Fig. II.

Find the side EF of Fig. II

A) 20 cm B) 5 cm C) 4 cm D) 3 cm

36. Express 4037 in standard form

A) 4.037×10^{-4}

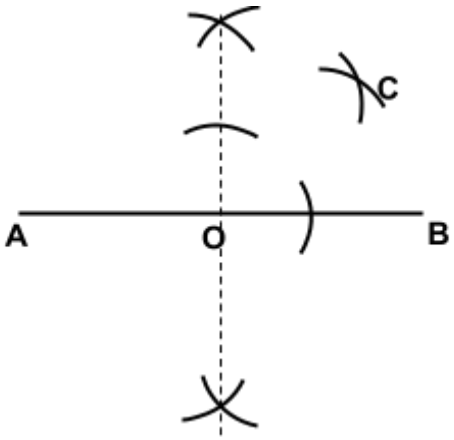
B) 4.037×10^{-3}

C) 4.037×10^{3}

D) 4.037×10^{4}

37. Which of the following angles can be constructed by using the arcs at point C in the diagram below?

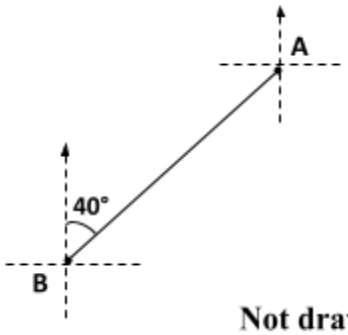
A) 30° B) 45° C) 60° D) 75°



38. Given that vector **a** =(− 5 12) and **b** =(10x 12)find the value of x if **a** = **b**.

A) -2 B) - ½ C) ½ D) 2

39.



Not drawn to scale

In the diagramabove, the bearing of point **B** from **A** is

A) 340° B) 220° C) 140° D) 50°

40. Ama is 9 years older than Kwame. If Kwame is 18 years old, find the ratio of the age of Kwame to that of Ama.

A) 3 : 2 B) 1 : 3 C) 2 : 3 D) 2 : 1

MATHEMATICS 1

OBJECTIVE TEST
SOLUTIONS

1. D. {Seth, Mary, Jacob, Evelyn}
2. D) all the members of set B are in set A
3. D) 720
4. A) 8
5. C) 40, 41
6. A. {-10, -4, 0, 45, 100}
7. C) GH¢27.50
8. A) -3
9. C) -5, 0, 0.5,
10. D) 22
11. A) 198.6
12. C) 36
13. A) 24 minutes
14. A) 15.0%
15. D) 2.5%
16. A) $3x^3y^7$
17. B) 48
18. A) 126.0°
19. $^{11}/_{19}$ (NB: Not included in given options)
20. D) 16
21. D. $(x + 2)(y + 5)$
22. B. {2,3}
23. D) $x \leq 2$
24. C) $x \rightarrow 4x+3$
25. B) 16 π cm
26. C) Square
27. C) 2
28. B) 60
29. D) 6
30. D) 44°
31. C) $z^2 = (y^2 - x^2)$
32. D) 12.5%
33. D. $\begin{pmatrix} -1 \\ -4 \end{pmatrix}$
34. B) TR
35. D) 3 cm
36. C) 4.037×10^3
37. B) 45°
38. B) - ½
39. B) 220°
40. C) 2: 3

MATHEMATICS 2

ESSAY

1. **(a)** $(m + n)(2x - y) - x(m + n)$

Method 1

$= (m + n)[2x - y - x]$ — Factorizing (m + n) out

$= (m + n)(2x - x - y)$

$= \underline{(m + n)(x - y)}$ — NB: $(m + n)(x - y) = (x - y)(m + n)$

Method 2

$(m + n)(2x - y) - x(m + n)$ — Expanding

$= 2mx - my + 2nx - ny - mx - nx$

$= 2mx - mx + 2nx - nx - my - ny$ — Grouping like terms & simplifying

$= mx + nx - my - ny$ — Factorizing

$= x(m + n) - y(m + n)$

$= \underline{(m + n)(x - y)}$ — Factorizing (m+n) out

1 (b) (i)

$A = \{2, 4, 6, 8, 10, 12, 14, 16, 18\}$

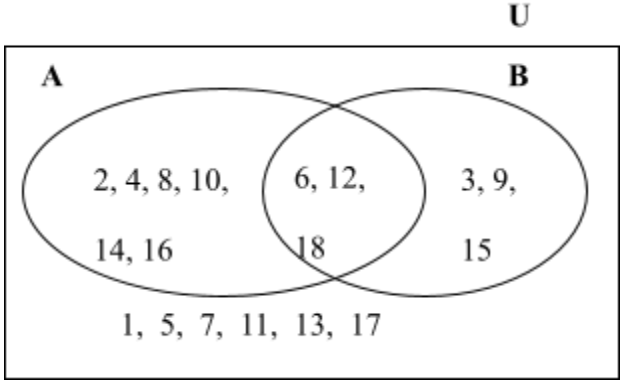
$B = \{3, 6, 9, 12, 15, 18\}$

$A \cap B = \{6, 12, 18\}$

$A \cup B = \{2, 3, 4, 6, 8, 9, 10, 12, 14, 15, 16, 18\}$

$(A \cup B)' = \{1, 5, 7, 11, 13, 17\}$

1(b) (ii)



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1 (c) $\begin{pmatrix}5\\3\end{pmatrix} + 2\begin{pmatrix}x\\y\end{pmatrix} - \begin{pmatrix}1\\-7\end{pmatrix} = 0$

Using the horizontal (x) component, we have

$5 + 2x - 1 = 0$

$\Rightarrow \quad 2x = 1 - 5$

Solving for x

$\Rightarrow \quad \frac{2x}{2} = \frac{-4}{2}$

$\Rightarrow \quad \underline{x = -2}$

Using the vertical (y) component, we have

$3 + 2y - (-7) = 0$

$\Rightarrow \quad 3 + 2y + 7 = 0$

Solving for y

$\Rightarrow \quad 2y + 10 = 0$

$\Rightarrow \quad 2y = -10$

$\Rightarrow \quad y = \frac{-10}{2}$

$\Rightarrow \quad \underline{y = -5}$

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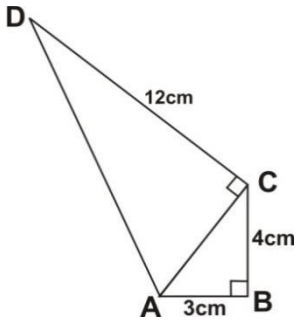
2. **(a)** 2,483.65 + 701.532 + 102.7

$$\begin{array}{r} 2483.65 \\ 701.532 \\ +\ 102.7 \\ \hline 3287.882 \end{array}$$

Ensure that the places of the addends are in line

$\approx$ 3287.9 (one decimal place)

2 (b)



(i) Side **AC** is the hypotenuse of triangle ABC.

From the Pythagorean theorem,

$$|AC|^2 = |AB|^2 + |BC|^2$$

$$\Rightarrow \quad |AC|^2 = (3cm)^2 + (4cm)^2$$

$$\Rightarrow \quad |AC|^2 = 9cm^2 + 16cm^2$$

$$\Rightarrow \quad |AC|^2 = 25cm^2$$

$$\Rightarrow \quad |AC| = \sqrt{25cm^2}$$

$$\Rightarrow \quad |AC| = 5\ cm$$

Now, side **AD** is the hypotenuse of triangle ACD

From the Pythagorean theorem,

$$|AD|^2 = |AC|^2 + |CD|^2$$

$$\Rightarrow \quad |AD| = \sqrt{(5cm)^2 + (12cm)^2}$$

$$\Rightarrow \quad |AD| = \sqrt{169cm^2}$$

$$\Rightarrow \quad |AD| = 13cm$$

Hence the perimeter of ABCD

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$$= \left|\text{AB}\right| + \left|BC\right| + \left|CD\right| + \left|DA\right|$$

$$= 3\,cm + 4cm + 12cm + 13cm$$

$$= 32\,\text{cm}$$

The perimeter of ABCD is 32 cm

2 (b) (ii) Area of (ABCD = ΔABC + ΔACD)

$$= \tfrac{1}{2}(b_1h_1) + \tfrac{1}{2}(b_2h_2)$$

$$= \tfrac{1}{2}(3cm)(4cm) + \tfrac{1}{2}(5cm)(12cm)$$

$$= 6cm^2 + 30cm^2$$

$$= 36cm^2$$

The area of ABCD is 36 cm^2

3. **(a)**

$$\frac{2^7 \times 3^4 \times 5^3}{2^3 \times 3^2 \times 5^2}$$

$$= \frac{2^7}{2^3} \times \frac{3^4}{3^2} \times \frac{5^3}{5^2}$$

$$= 2^4 \times 3^2 \times 5$$

$$= 8 \times 9 \times 5$$

$$= 360$$

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$= \quad 3.6 \times 10^2$

3 (b) Distance ridden = x km

Distance walked = $\frac{1}{2}$ h × 6km/h = 3km

Total distance = 10 km

Dist. ridden + dist. walked = total dist.

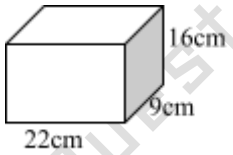
⇒ x km + 3 km = 10 km

⇒ x km = 10 km – 3km

⇒ x km = 7 km

The distance Kwame covered by bicycle is 7 km

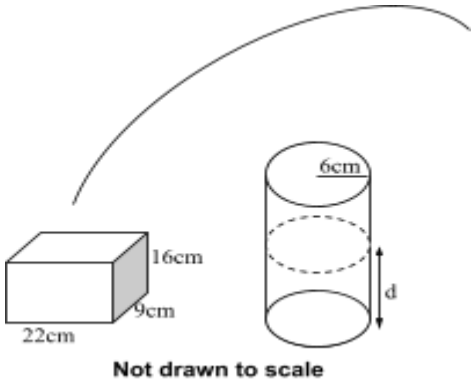
3 (c) (i)



Volume = length × width × height

= $22cm \times 9cm \times 16cm$

= 3168cm^3



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Let d = the depth of water in the cylinder

3 (c) (ii) **Method 1** (Using calculated volume of rectangular tank)

Vol. of water in rectangular tank = Vol. of water in cylinder

$\Rightarrow \quad 3168\text{cm}^3 = \pi r^2 \times d$

$\Rightarrow \quad 3168\text{cm}^3 = {}^{22}/_{7} \times (6\text{cm})^2 \times \text{d}$ — Substituting

$\Rightarrow \quad 3168\text{cm}^3 = {}^{22}/_{7} \times 36\text{cm}^2 \times \text{d}$

$\Rightarrow \quad \frac{3168\,cm^3}{\frac{22}{7} \times 36cm^2} = \text{d}$ — Dividing both sides by ${}^{22}/_{7} \times 36\text{cm}^2$

$\Rightarrow \quad \frac{3168}{\frac{792}{7}}\,cm = \text{d}$ — Simplifying

$\Rightarrow \quad 3168 \div \frac{792}{7}\ \text{cm} = \text{d}$

$\Rightarrow \quad 3168 \times \frac{7}{792}\ \text{cm} = \text{d}$ — You may avoid the tedious simplification here by using Method 2 below

$\Rightarrow \quad 28\ \text{cm} = \text{d}$

Hence the depth of water in the cylindrical container = 28cm

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3(c)(ii) **Method 2** (Using the given dimensions of rectangular tank)

Vol. of water in cuboid = Vol. of water in cylinder

$\Rightarrow \quad l \times w \times h_{\text{cuboid}} = \pi r^2 \times d_{\text{cylinder}}$

$[22\text{cm} \times 9\text{cm}] \times 16\text{cm} = [{}^{22}/_{7} \times (6\text{cm})^2] \times \text{d}$ *Substituting and solving for d*

$\Rightarrow \quad [22\text{cm} \times 9\text{cm}] \times 16\text{cm} = (\frac{22}{7} \times 6\text{cm} \times 6\text{cm}) \times \text{d}$

$$\Rightarrow \quad \frac{22\text{cm} \times 9\text{cm} \times 16\text{cm}}{\frac{22}{7} \times 6\text{cm} \times 6\text{cm}} = d$$ Simplifying

$$\Rightarrow \quad \frac{22\text{cm} \times 9\text{cm} \times 16\text{cm} \times 7}{22 \times 6\text{cm} \times 6\text{cm}} = d$$ Simplifying (by 'cancellation')

$$\Rightarrow \quad 28\text{ cm} = d$$

∴ The depth (d) of water in the cylindrical container = 28cm.

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4. (a)

Method 1 (Evaluating whole number and fractions separately)

$$7\tfrac{2}{3} - 4\tfrac{5}{6} + 2\tfrac{3}{8}$$

$$\Rightarrow \quad 7 - 4 + 2 + \tfrac{2}{3} - \tfrac{5}{6} + \tfrac{3}{8}$$

$$\Rightarrow \quad 5 + \frac{16 - 20 + 9}{24}$$

$$\Rightarrow \quad 5 + \tfrac{5}{24}$$

$$= \quad 5\tfrac{5}{24}$$

4 (a) **Method 2** (Changing mixed fractions to improper fractions)

$$7\tfrac{2}{3} - 4\tfrac{5}{6} + 2\tfrac{3}{8}$$

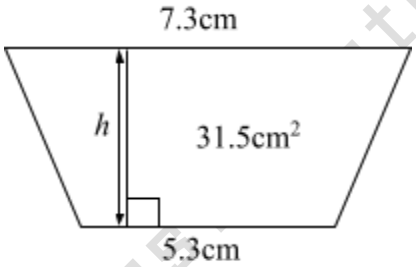
$$\Rightarrow \quad \frac{23}{3} - \frac{29}{6} + \frac{19}{8}$$

$$\Rightarrow \quad \frac{184 - 116 + 57}{24}$$

$$\Rightarrow \quad \frac{125}{24}$$

$$= \quad 5\tfrac{5}{24}$$

4 (b)



Let h = perpendicular dist. between parallel sides

Method 1 (Substituting first)

Area = ½ (sum of parallel sides) × h

$$\Rightarrow \quad 31.5\text{cm}^2 = \tfrac{1}{2}(7.3\text{cm} + 5.3\text{cm}) \times h$$

Mulitiplying both sides by 2 to remove fraction

$$\Rightarrow \quad 2 \times 31.5\ \text{cm}^2 = 2 \times \tfrac{1}{2}(7.3\text{cm} + 5.3\text{cm}) \times h$$

$$\Rightarrow \quad 63\text{cm}^2 = 12.6\text{cm} \times h$$

Dividing both sides by 12.6 cm to find 'h'

$$\Rightarrow \quad \frac{63\,\text{cm}^2}{12.6\,\text{cm}} = \frac{12.6\text{cm} \times h}{12.6\text{cm}}$$

Multiplying both numerator and deneminator by 10 and breaking down by cancellation

$$\frac{630\,\text{cm}^2}{126\,\text{cm}} = h$$

$$\Rightarrow \quad 5\,\text{cm} = h$$

4 (b) **Method 2** (Making *h* the subject first)

Let A = Area of trapezium

$c + d$ = sum of parallel sides

h = perpendicular dist. between parallel sides

$$\Rightarrow \quad A = \tfrac{1}{2}(c + d)\,h$$

Mulitiplying both sides by 2 to remove fraction

$$\Rightarrow \quad 2 \times A = 2 \times \tfrac{1}{2}(c + d)\,h$$

$$\Rightarrow \quad 2A = (c + d)\,h$$

Dividing both sides by 'c+d' to make 'h' the subject

$$\Rightarrow \quad \frac{2A}{c + d} = h$$

Switching positions

$$\Rightarrow \quad h = \frac{2A}{c + d}$$

Substituting values to find 'h'

$$\Rightarrow \quad h = \frac{2 \times 31.5\,\text{cm}^2}{7.3\,\text{cm} + 5.3\,\text{cm}}$$

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$$h = \frac{63\,\text{cm}^2}{12.6\,\text{cm}} = 5\,\text{cm}$$

The perpendicular distance between the parallel sides is 5 cm.

4 (c)

(i) The mean mark $= \dfrac{92+85+65+x}{4}$

(ii) If the mean is less than 80 then $\dfrac{92+85+65+x}{4} < 80$, $\{x: x \geq 0\}$

(iii)

$$\frac{92+85+65+x}{4} < 80$$

$$\Rightarrow \frac{242+x}{4} < 80$$

$$\Rightarrow 4\times\left(\frac{242+x}{4}\right) < 4\times 80$$

$$\Rightarrow 242 + x < 320$$

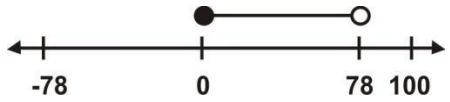
$$\Rightarrow x < 320 - 242$$

$$\Rightarrow x < 78 \qquad \{x: x < 78,\ x \geq 0\}$$

The possible marks (x) that Efe scored in the test

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$= \quad 0 \le x < 78$



5. (a)

Method 1 (Clearing fractions first)

$$\frac{4x-3}{2} = \frac{8x-10}{8} + 2\tfrac{3}{4}$$

$$\Rightarrow \quad \frac{4x-3}{2} = \frac{8x-10}{8} + \frac{11}{4}$$

Changing mixed fraction to improper fraction

$$8\times\left(\frac{4x-3}{2}\right) = 8\times\left(\frac{8x-10}{8}\right) + 8\times\frac{11}{4}$$

Multiplying through by 8 (to clear fractions):

$$\Rightarrow \quad 4(4x-3) = 8x-10 + 2(11)$$

Expanding and Simplifying

$$\Rightarrow \quad 16x-12 = 8x-10 + 22$$

Grouping like terms on one side

$$\Rightarrow \quad 16x-8x = 12-10 + 22$$

$$\Rightarrow \quad 8x = 24$$

Dividing both sides by 8 to find x

$$\Rightarrow \quad x = \frac{24}{8} = \underline{3}$$

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5 (a)

Method 2 (Grouping and simplifying terms containing the variable first)

$$\frac{4x-3}{2} = \frac{8x-10}{8} + 2\frac{3}{4}$$

$$\Rightarrow \quad \frac{4x-3}{2} - \frac{8x-10}{8} = 2\frac{3}{4}$$

Grouping the terms containing the variable

$$\Rightarrow \quad \frac{4(4x-3)-(8x-10)}{8} = \frac{11}{4}$$

Simplifying

$$\Rightarrow \quad \frac{16x-12-8x+10}{8} = \frac{11}{4}$$

$$\Rightarrow \quad \frac{16x-8x-12+10}{8} = \frac{11}{4}$$

$$\Rightarrow \quad \frac{8x-2}{8} = \frac{11}{4}$$

$$\Rightarrow \quad 4(8x-2) = 8(11)$$

Cross multiplying

$$\Rightarrow \quad 32x-8 = 88$$

$$\Rightarrow \quad 32x = 88+8$$

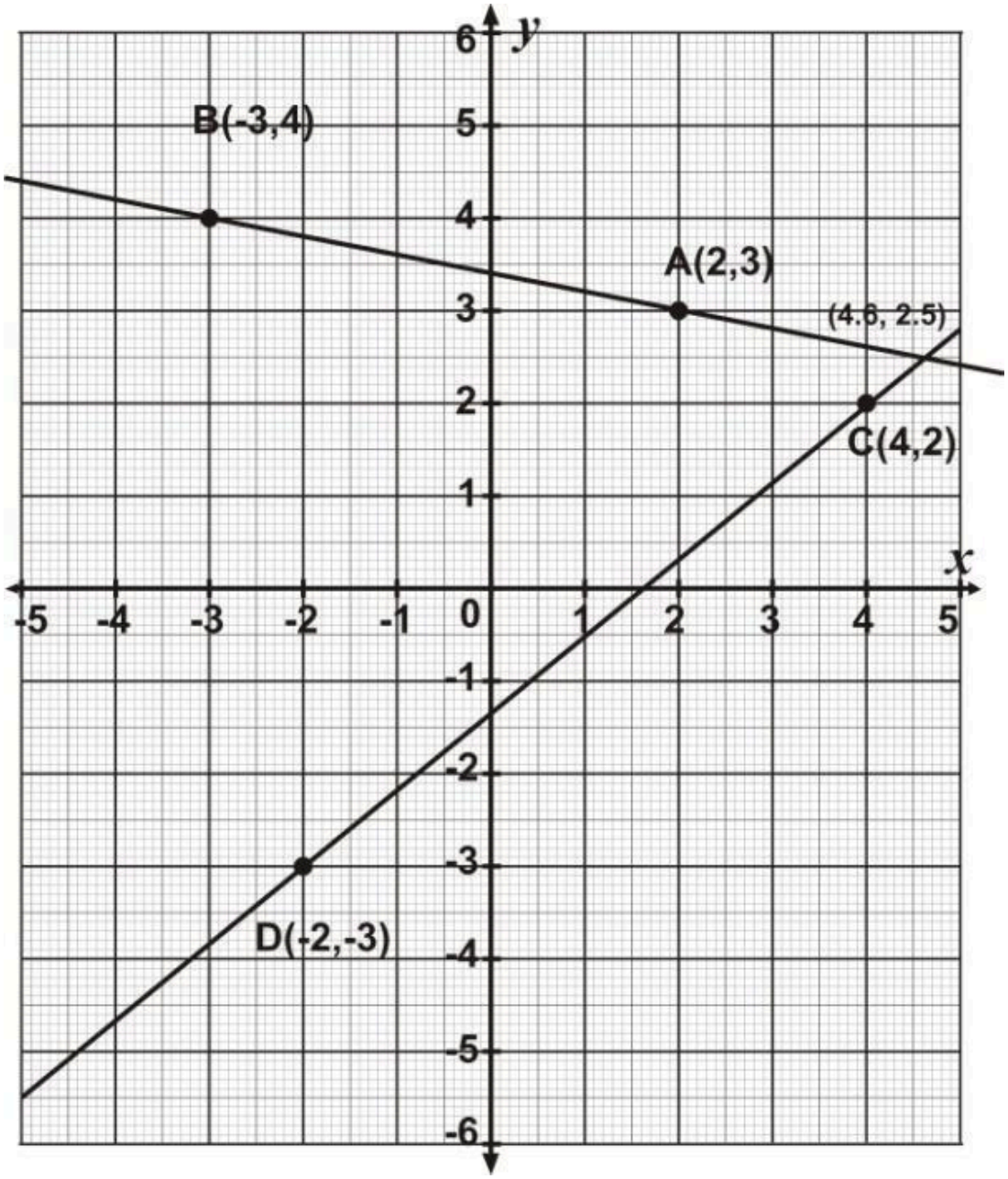
Simplifying and finding x

$$\Rightarrow \quad \frac{32x}{32} = \frac{88+8}{32} = \frac{96}{32}$$

$$\Rightarrow \quad x = 3$$

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5 (b)



5 (b) (iii) The acute angle between lines AB and CD ≈ 50°

5(b) (iv) The coordinates of the point at which the lines through AB and CD meet

$\approx$ (4.6, 2.5)

6.

(a) (i) The Mode = The most-occurring number of letters

(the number of letters with the highest frequency)

$\Rightarrow$ The mode = 7 letters

(ii)

No. of letters (x)	No. of students (f)	fx
4	7	28
5	3	15
6	2	12
7	8	56
8	5	40
9	3	27
10	1	10
	$\Sigma f = 29$	$\Sigma fx = 188$

The mean $= \frac{\Sigma f x}{\Sigma f} = \frac{188}{29}$

$= 6\frac{14}{29} \approx 6.483$

6 (b) P(surname has more than 7 letters)

$= \frac{\text{Number of students with more than 7 letters in surname}}{\text{Total number of students}}$

$= \frac{5+3+1}{7+3+2+8+5+3+1}$

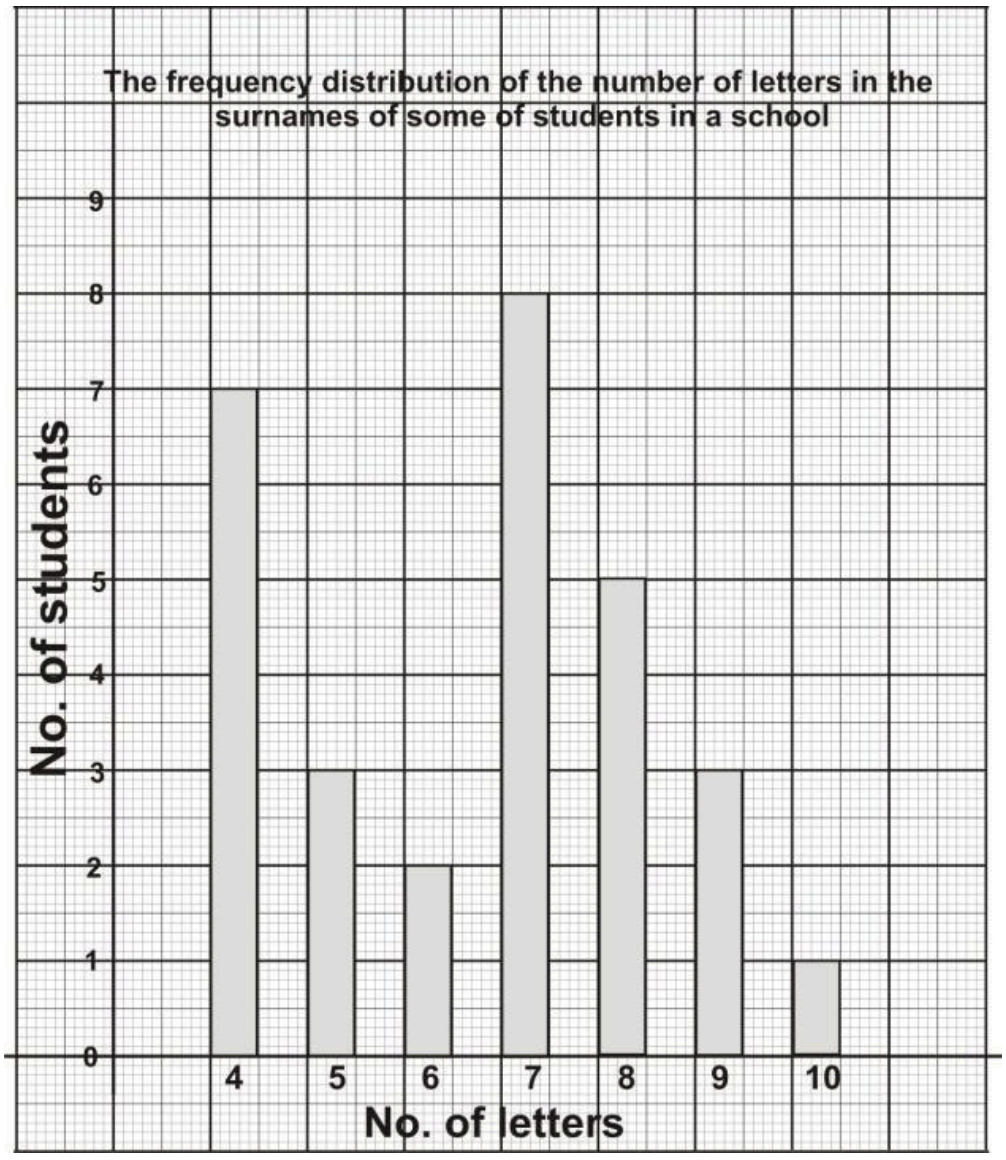
$= \frac{9}{29}$

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The probability that a student selected at random has a surname with more than 7 letters = $\frac{9}{29}$

6 (c)

Vertical AxisScale: 2cm to 1 student



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