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

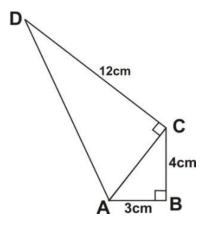
Marks will **not** be awarded for correct answers without corresponding working.

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, $(A \cap B)$, (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

$$\binom{5}{3} + 2 \binom{x}{y} - \binom{1}{-7} = 0$$

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 $\frac{1}{2}$ 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 cm². 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

	A) 3	B) 6	C) 240	D) 720	
4.	The sum of 5 and	d x divided by 4 i	s equal to 3.25. Fin	nd the value of x.	
	A) 8	B) 7	C) 21/4	D) $-3\frac{4}{13}$	
5.	The numbers 32. Find the missing A) 35, 36		2 form a sequence C) 40,		

sets A and B have the same number of elements

some members of set B can be found in set A

1.

2.

3.

Which of the following sets is well defined?

B.

C.

D.

B)

C)

D)

If set B is a subset of set A, then

{Man, Kofi, Red, 14}

{Ink, Mango, Green, Nail}

{Car, Road, Glass, Book}

{Seth, Mary, Jacob, Evelyn}

no member of set B is in set A

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

all the members of set B are in set A

6.	Write down all the integers in the set $A = \{-10, -4, 0, \frac{1}{4}, \frac{21}{2}, 45, 100\}$					
	A.	A. {-10, -4, 0, 45, 100}				
	B.	{-10, -4}				
	C.	{0, 45, 100}				
	D.	$\{\frac{1}{4}, \frac{21}{2}\}$				
7.	Find the total co	st of 25 pens and	75 books i	f each pen cost	s GH¢ 0.20 and each bool	k costs GH¢ 0 30
, .	A) GH¢22.50				0 D) GH¢50.00	2000 0117 0.00.
	11) 311/22.00	2) 31192	3.00	c) G11 /2 7.8	<i>D</i> , 311,20.00	
8.	Simplify - 27	+ 18 - (10 - 14)	- (-2)			
	A) - 3	B) -7	C) – 11	D) –	35	
9.	Arrange the follo	owing numbers fi	rom the low	vest to the high	est: 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 p	pieces of cloth 5½	m long th	at can be cut fr	om a roll of cloth 121 m l	ong.
	A) 665½	B) 115½	C) 66	D) 22		
11.	Find the value o	f 124.3 + 0.275 +	· 74.06, cor	recting your an	swer to one decimal place	e.
	A) 198.6	B) 198.7	C) 892.0	Г	9) 892.4	
12.	Esi and Kwasi a	re 12 and 8 years	old respect	tively. They sha	are 60 mangoes in the rati	o of their ages. How
	many mangoes of	does Esi get?				
	A) 42	B) 40		C) 36	D) 18	
13.	It takes 6 studen	ts 1 hour to swee	p their scho	ool compound.	How long will it take 15 s	students to sweep
	the same compound?				•	
	A) 24 minutes	B) 12 min	nutes	C) 3 hours	D) 2 hours	
14.	A housing agent	makes a commis	ssion of GF	I¢ 103 500 whe	en he sells a house for GH	¢ 690 000
		rcentage of his co			50115 & 10450 101 011	, -, -, -, -, -, -, -, -, -, -, -, -, -,
	A) 15.0%	B) 10.0		C) 7.5%	D) 5.0%	
	,	-, - 3.0		,	<i>)</i> · ·	

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 annu	um.				
	A) 20.0%	B) 10.0%	C) 5.0%	D) 2.5%		
16.	Simplify: $(8x^2y)$	$(\frac{3}{8}xy^4)$				
	A) $3x^3y^7$	B) $3x^2y^7$	C) $3x^3y^4$	D) 3xy		

17. The scores of 10 students in an examination 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)
- If $x \in \{2, 3, 4, 5\}$, find the truth set of 2x + 1 < 822.
 - A. {2,3,4}
- B. {2,3}
- C. {3,4} D. {4,5}
- Solve the inequality: $7x (10x + 3) \ge -9$ 23.
 - A) $x \ge 2$

- B) $x \le 4$ C) $x \ge 4$ D) $x \le 2$
- Find the rule of the mapping: 24.

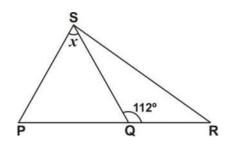
- A) $x \rightarrow 4x-3$
- B) $x \to 3-4x$ C) $x \to 4x+3$
- D) $x \rightarrow 4x + 5$
- Find the circumference of a circle whose area is equal to 64π cm². 25.
 - A) $32 \, \pi \, \text{cm}^2$
- B) $16 \, \pi \, \text{cm}^2$
- C) $8 \pi \text{ cm}^2$
- D) $4 \pi \text{ cm}^2$
- Which of the following geometric figures is the plane shape of a cube? 26.
 - Circle A)
 - B) Rectangle
 - Square C)
 - D) Triangle
- 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
- C) 30 D) 1.
- 29. The interior angle of a regular polygon is 120°. How many sides has this polygon?
 - A) 3
- B) 4

C) 5

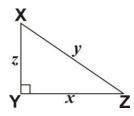
D) 6

30.



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

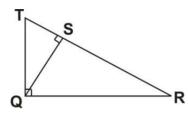
- A) 68°
- B) 56°
- C) 46°
- D) 44°
- **31. XYZ** is a right-angled triangle with length of sides as shown.



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%

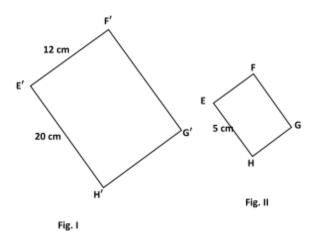
- The point (4,5) is translated to the point (3,1). What is the translation vector? 33.
- $\begin{array}{c}
 \begin{pmatrix} 1 \\ -4 \end{pmatrix} & D. & \begin{pmatrix} -1 \\ -4 \end{pmatrix}
 \end{array}$
- In the diagram below, triangle QRT is the enlargement of QST. 34.



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

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

<u>35.</u>



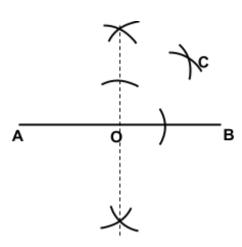
Not drawn to scale

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

Find the side EF of Fig. II

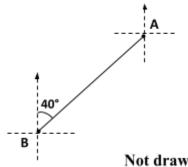
- A) 20 cm
- B) 5 cm
- C) 4 cm
- D) 3 cm

- Express 4037 in standard form 36.
 - $4.037\times10^{\text{-4}}$ A)
 - 4.037×10^{-3} B)
 - 4.037×10^{3} C)
 - 4.037×10^4 D)
- Which of the following angles can be constructed by using the arcs at point C in the diagram below? 37.
 - A) 30°
- B) 45°
- C) 60°
- D) 75°



- Given that vector $\mathbf{a} = (-5 \ 12)$ and $\mathbf{b} = (10x \ 12)$ find the value of x if $\mathbf{a} = \mathbf{b}$. 38.
 - A) -2
- B) $-\frac{1}{2}$ C) $\frac{1}{2}$
- 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) $x \le 2$

- **24.** C) $x \rightarrow 4x + 3$
- 25. B) 16π 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%

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

34. B) TR

33.

- **35.** D) 3 cm
- **36.** C) 4.037×10^3
- 37. B) 45°
- 38. B) $-\frac{1}{2}$
- **39.** B) 220°
- 40. C) 2: 3

MATHEMATICS 2

ESSAY

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

Method 1

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

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

Factorizing (m + n) out

NB: (m + n) (x - y) = (x - y)(m + n)

Method 2

$$(m+n)(2x-y) - x(m+n)$$
= $2mx - my + 2nx - ny - mx - nx$
= $2mx - mx + 2nx - nx - my - ny$
= $mx + nx - my - ny$
= $x(m+n) - y(m+n)$
= $(m+n)(x-y)$

Expanding

Grouping like terms & simplifying

Factorizing

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\triangle B = $\{6, 12, 18\}$
A\triangle B = $\{2, 3, 4, 6, 8, 9, 10, 12, 14, 15, 16, 18\}$
(A\triangle B)' = $\{1, 5, 7, 11, 13, 17\}$



A B 2, 4, 8, 10, 6, 12, 3, 9, 14, 16 18 15 1, 5, 7, 11, 13, 17

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

Using the horizontal (x) component, we have

$$5 + 2x - 1 = 0$$

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

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

$$\Rightarrow x = -2$$

Solving for x

Using the vertical (y) component, we have

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

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

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

$$\Rightarrow 2y = -10$$

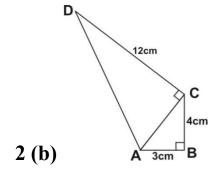
$$\Rightarrow y = \frac{-10}{2}$$

$$\Rightarrow y = -5$$

Solving for y

Ensure that the places of the addends are in line

$$\approx 3287.9$$
 (one decimal place)



(i) $|AC|^{2} = (3cm)^{2} + (4cm)^{2}$ $|AC|^{2} = 9cm^{2} + 16cm^{2}$ $|AC|^{2} = 9c^{2}$ Side **AC** is the hypotenuse of triangle ABC.

$$\left|AC\right|^2 = \left|AB\right|^2 + \left|BC\right|^2$$

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

$$|AC|^2 = 9cm^2 + 16cm^2$$

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

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

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

Now, side AD is the hypotenuse of triangle ACD From the Pythagorean theorem,

$$\left| AD \right|^2 = \left| AC \right|^2 + \left| CD \right|^2$$

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

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

$$\rightarrow$$
 $|AD| = 13cm$

Hence the perimeter of ABCD

$$= |AB| + |BC| + |CD| + |DA|$$

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

$$= 32 cm$$

The perimeter of ABCD is 32 cm

2 (b) (ii) Area of (ABCD =
$$\triangle$$
ABC + \triangle ACD)
= $\frac{1}{2}(b_1h_1) + \frac{1}{2}(b_2h_2)$
= $\frac{1}{2}(3cm)(4cm) + \frac{1}{2}(5cm)(12cm)$
= $\frac{6cm^2 + 30cm^2}{36cm^2}$

The area of ABCD is 36 cm²

3. **(a)**

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

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

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

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

$$= 360$$

$$3.6 \times 10^{2}$$

3 (b) Distance ridden =
$$x \text{ km}$$

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

Total distance 10 km

Dist. ridden + dist. walked = total dist.

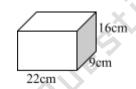
$$\Rightarrow$$
 $x \text{ km} + 3 \text{ km} = 10 \text{ km}$

$$\Rightarrow$$
 $x \text{ km} = 10 \text{ km} - 3 \text{km}$

7 km x km

The distance Kwame covered by bicycle is 7 km

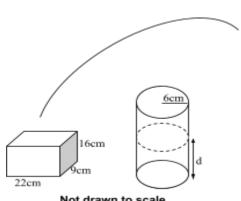
3 (c) (i)



Volume $length \times width \times height$

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

3168cm³



Not drawn to scale

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

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

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

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

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

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

$$\Rightarrow \frac{3168}{\frac{792}{7}} cm = d$$
 Simplifying

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

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

$$\Rightarrow$$
 28 cm = d

You may avoid the tedious simplification here by using Method 2 below

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

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

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

$$[22\text{cm} \times 9\text{cm}] \times 16\text{cm} = [^{22}/_7 \times (6\text{cm})^2] \times d$$
 Substituting and

solving for d

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

$$22\text{cm} \times 9\text{cm} \times 16\text{cm}$$

$$\Rightarrow \frac{\frac{22}{7} \times 6 \text{cm} \times 6 \text{cm}}{= \text{d}}$$

Simplifying

$$\Rightarrow \frac{22 \text{cm} \times 9 \text{cm} \times 16 \text{cm} \times 7}{22 \times 6 \text{cm} \times 6 \text{cm}} = c$$

Simplifying (by

'cancellation')

$$\Rightarrow$$
 28 cm

= d

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

4. (a)

Method 1 (Evaluating whole number and fractions separately)

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

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

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

$$\Rightarrow$$
 5 + $\frac{5}{24}$

$$=$$
 $5\frac{5}{24}$

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

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

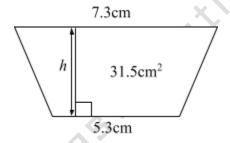
$$\frac{23}{3} - \frac{29}{6} + \frac{19}{8}$$

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

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

$$= \frac{5\frac{5}{24}}{24}$$

4 (b)



Let h = perpendicular dist. between parallel sides

= $\frac{1}{2}$ (sum of parallel sides) × h

Method 1 (Substituting first)

⇒
$$31.5 \text{ cm}^2 = \frac{1}{2} (7.3 \text{ cm} + 5.3 \text{ cm}) \times h$$

⇒ $2 \times 31.5 \text{ cm}^2 = 2 \times \frac{1}{2} (7.3 \text{ cm} + 5.3 \text{ cm}) \times h$

 $\rightarrow 63 \,\mathrm{cm}^2 = 12.6 \,\mathrm{cm} \times h$

Mulitiplying both

sides by 2 to remove fraction

Dividing both sides by

12.6 cm to find 'h'

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

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

Multiplying both numerator and denominator by 10 and breaking down by campelliation.

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

5 cm = h

= Area of trapezium Let Α c + d = sum of parallel sides= perpendicular dist. between parallel sides

$$A = \frac{1}{2} (c + d) h$$

$$2 \times A = 2 \times \frac{1}{2} (c + d) h$$

$$2 A = (c + d) h$$

$$2 A = (c + d) h$$

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

 \Rightarrow

 \Rightarrow

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

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

Mulitiplying both sides by 2 to remove

fraction

Dividing both sides by

'e+d" to make "h" the srubject

Switching positions

Substituting values to

find 'h'

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

The perpendicular distance between the parallel sides is <u>5 cm</u>.

4 (c)

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

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

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

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

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

$$\Rightarrow 242+x < 320$$

$$\Rightarrow x < 320 - 242$$

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

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

5. (a)

Method 1 (Clearing fractions first)

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

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

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

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

$$\rightarrow$$
 16x - 12 = 8x - 10 + 22

$$16x - 8x = 12 - 10 + 22$$

$$3x = 24$$

$$x = \frac{24}{8} \qquad = \qquad \underline{3}$$

Changing mixed fraction to improper fraction

Multiplying through by 8 (to clear fractions):

Expanding and Simplifying

Grouping like terms on one side

Dividing both sides by 8 to find x

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

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

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

Grouping the terms containing the variable

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

Simplifying

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

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

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

$$4(8x-2) = 8(11)$$

Cross multiplying

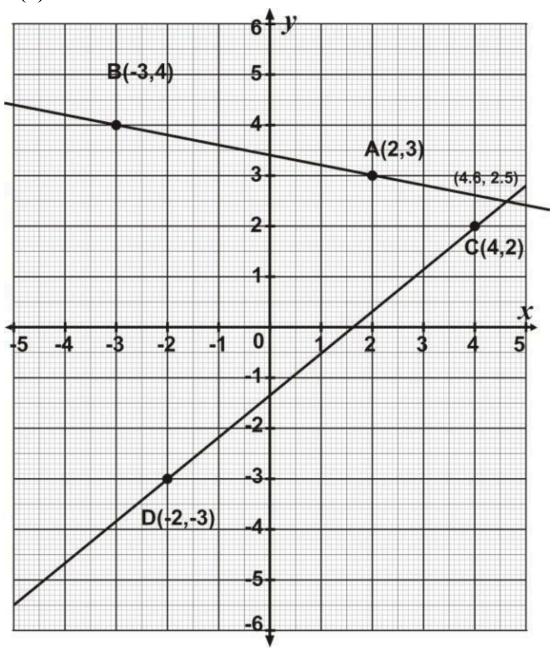
$$\Rightarrow$$
 32 x = 88 + 8

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

$$x = 3$$

Simplifying and finding *x*

5 (b)



5 (b) (iii) The acute angle between lines AB and CD $\approx 50^{\circ}$

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 = $\frac{7 \text{ letters}}{}$

(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
	Σf= 29	$\Sigma fx=188$

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

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

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

Number of students with more than 7 letters in surname

Total number of students

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

$$\frac{9}{2}$$

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

