Name:	Index Number:	Class:

HUA YI SECONDARY SCHOOL

2E

End-of-Year Examination 2016

2E

Mathematics

Paper 1

10 October 2016

1 h 30 min

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** the questions.
If working is needed for any question, it must be shown with the answer.
Omission of essential working will result in loss of marks.
The use of an approved scientific calculator is expected, where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to 3 significant figures. Give answers in degrees to 1 decimal place. For , use either your calculator value or 3.142, unless the question requires the answer in terms of .

The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **10** printed pages including the cover page.

[Turn Over

For Examiner's Use

1. Solve the following simultaneous equations.

$3x - 4y = 30$ --- (1)

$7y = 2x - 33$ --- (2)

Answer ..... [3]

---

2. Given that m is inversely proportional to $(n-2)^2$, and that $m = -2$ when $n = 5$. Find

(a) an equation involving m and n.

(b) the value(s) of n when $m = -4\frac{1}{2}$.

(a) ..... [2]

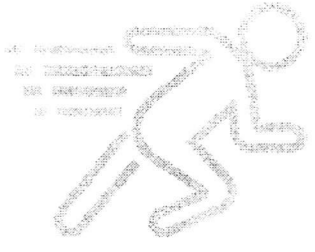
(b) ..... [3]

3. Expand and simplify the following.

(a) $(3p - 7q)(2p + 5q)$

(b) $2(3m - 4)^2$

(c) $(x - 2)(x + 2)(x^2 + 4)$



(a) ..... [2]

(b) ..... [2]

(c) ..... [2]

For Examiner's Use

4. Factorise the following completely.

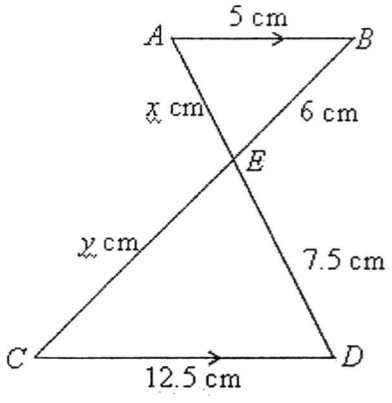
(a) $2m^2 + 5mn - 3n^2$

(b) $px - py + qy - qx$

(a) ..... [2]

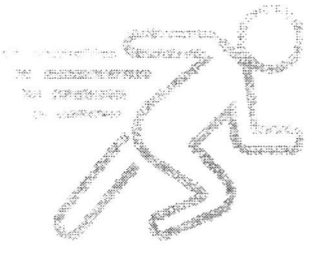
(b) ..... [2]

5. In the figure shown below, AB // CD.



(a) Name a pair of similar triangles.

(b) Find the value of x and y.



(a) ..... [1]

(b) ..... [2]

For Examiner's Use

6. Map A is drawn to a scale of 1 : 60 000.

(a) Find the distance between 2 towns on the map if the actual distance between the 2 towns is 12.6 km.

(b) A lake on the map has an area of 3.7 cm^2. Find the actual area of the lake in km^2.

(a) ..... [1]

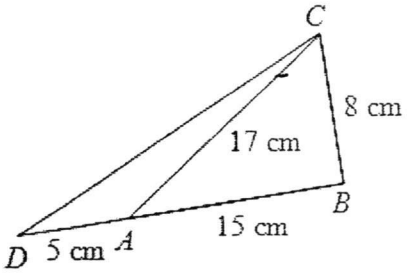
(b) ..... [2]

7. Given that $\sqrt{\frac{z-y}{y}} = \frac{1}{x}$, express y in terms of x and z.

Answer ..... [3]

For Examiner's Use

8. In triangle ABC, $AB = 15\,\text{cm}$, $BC = 8\,\text{cm}$ and $AC = 17\,\text{cm}$.



(a) Explain why triangle ABC is a right angle triangle.

(b) BA is produced to D and $AD = 5\,\text{cm}$. Find the length of DC.

(c) Find $\angle DAC$.

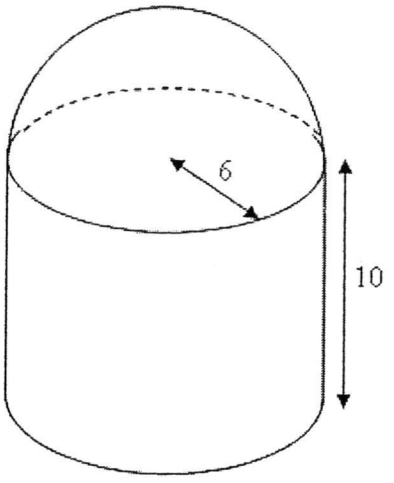
(a) [2]

(b) ..... [2]

(c) ..... [2]

For Examiner's Use

9. The iron solid is made up of a hemisphere joined to a cylinder with a radius of 6 cm and a height of 10 cm.



Calculate

(a) the volume of the solid,

(b) the surface area of the solid.

(a) ..... [3]

(b) ..... [3]

For Examiner's Use

10. A box contains 30 balls. of which 14 are yellow, 8 are green and the rest are blue. A ball is drawn at random from the box.

(a) Find the probability that the ball is yellow.

(b) Find the probability that the ball is either blue or green.

(c) Find the number of yellow balls that need to be removed so that the probability of drawing a yellow ball is $\frac{1}{3}$.

(a) ..... [1]

(b) ..... [1]

(c) ..... [1]

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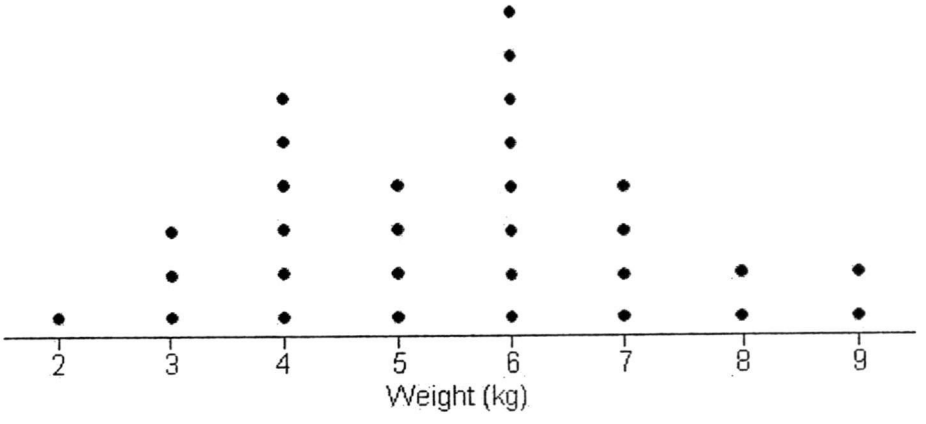
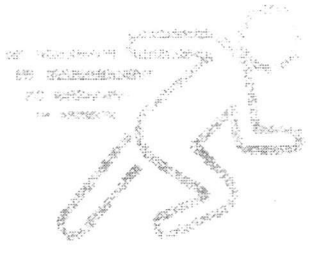
11. The dot diagram below shows the weight of 30 boxes.



(a) Write down the modal weight.

(b) Find the median weight.

(c) If the standard weight of a box is between 3 kg to 7 kg, find the percentage of the boxes that have standard weight.



(a) ..... [1]

(b) ..... [1]

(c) ..... [1]

For Examiner's Use

12. **(a)** Solve the inequality $4 - 3x \geq -15$ and represent its solution on a number line given.

(b) State the

(i) greatest rational number.

(ii) smallest prime number.

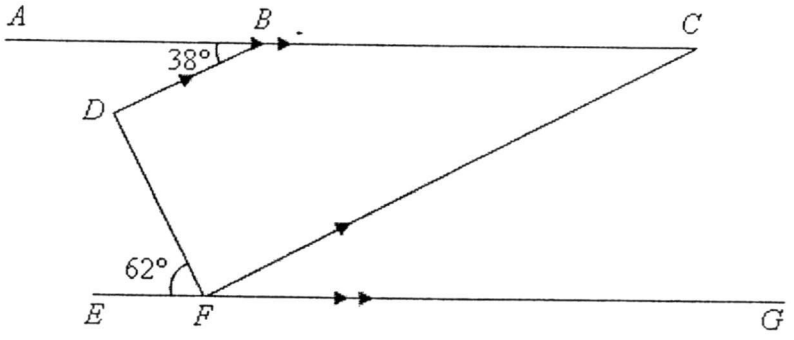
(a) ..... [2]

(b) (i) ..... [1]

(b) (ii) ..... [1]

---

13. In the diagram, the straight line ABC is parallel to EFG and DB is parallel to FC. It is given that $\angle ABD = 38°$ and $\angle DFE = 62°$.



Stating your reasons clearly, find

(a) $\angle BDF$,

(b) $\angle CFG$.

(a) ..... [2]

(b) ..... [1]

For Examiner's Use

14. **(a)** Given that $AD = 6.2$ cm and $BD = 10.4$ cm, construct the quadrilateral $ABCD$.

(b) Construct a line which is equidistant from B and C.

(c) Construct another line which is equidistant from AB and BC.

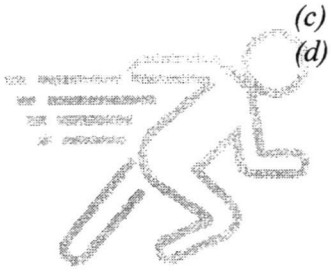
(d) A point M is equidistant from B and C, but is nearer to AB than BC. Mark and label the point M.

(a) [2]

(b) [1]

(c) [1]

(d) [1]



For Examiner's Use

15. In 2014, the price of a television set is $1000, which was an increase of 8% from 2013.

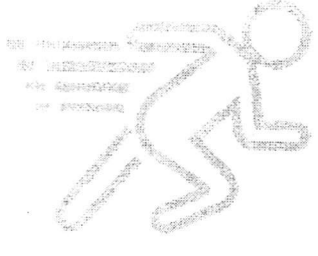
(a) Find the price of the television set in 2013.

(b) Ahmad bought the television set in 2014 and sold it in 2015 for a profit of 5%. Find the selling price of the television.

(a) ..... [2]

(b) ..... [1]

---- END OF PAPER ---



Name:	Index Number:	Class:

HUA YI SECONDARY SCHOOL

2E End-of-Year Examination 2016 **2E**

Mathematics

Paper 1 10 October 2016

1 h 30 min

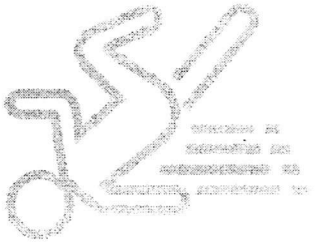
Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Marking Scheme

This document consists of **10** printed pages including the cover page.

[Turn Over



1. Solve the following simultaneous equations.

$3x - 4y = 30$ --- (1)

$7y = 2x - 33$ --- (2)

$3x = 30 + 4y$

$x = \dfrac{30 + 4y}{3}$ --- (1b)

Sub (1b) into (2). **[M1 any method]**

$7y = 2\left(\dfrac{30 + 4y}{3}\right) - 33$

$7y = \dfrac{8y}{3} - 13$

$y = -3$ **[A1]**

Sub $y = -3$ into (1b),

$x = 6$ **[A1]**

Answer ..... [3]

---

2. Given that m is inversely proportional to $(n-2)^2$, and that $m = -2$ when $n = 5$. Find

(a) an equation involving m and n.

(b) the value(s) of n when $m = -4\dfrac{1}{2}$.

(a) $m = \dfrac{k}{(n-2)^2}$

$-2 = \dfrac{k}{(5-2)^2}$

$k = -18$ **[M1]**

$m = \dfrac{-18}{(n-2)^2}$ **[A1]**

(b) $-4\dfrac{1}{2} = \dfrac{-18}{(n-2)^2}$

$(n-2)^2 = 4$ **[M1]**

$n - 2 = -2$ or 2

$n = 0$ or 4 **[A1,A1]**

(a) ..... [2]

(b) ..... [3]

3. Expand and simplify the following.

(a) $(3p-7q)(2p+5q)$

(b) $2(3m-4)^2$

(c) $(x-2)(x+2)(x^2+4)$

(a) $6p^2+15pq-14pq-35q^2$ **[M1]**

$=6p^2+pq-35q^2$ **[A1]**

(b) $2(9m^2-24m+16)$ **[M1]**

$=18m^2-48m+32$ **[A1]**

(c) $(x^2-4)(x^2+4)$ **[M1]**

$=x^4-16$ **[A1]**

(a) ..... [2]

(b) ..... [2]

(c) ..... [2]

---

4. Factorise the following completely.

(a) $2m^2+5mn-3n^2$

(b) $px-py+qy-qx$

(a) $2m-n \mid -mn$

$m+3n \mid 6mn$

$2m^2-3n^2 \mid 5mn$ **[M1]**

$(2m-n)(m+3n)$ **[A1]**

(b) $p(x-y)+q(y-x)$

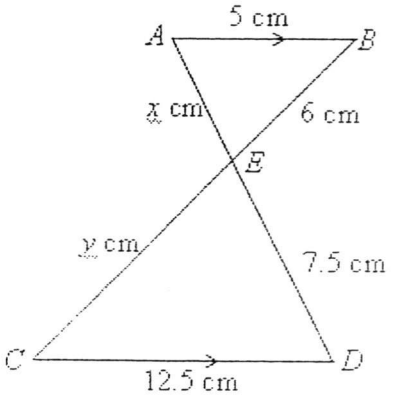
$=p(x-y)-q(x-y)$ **[M1]**

$=(p-q)(x-y)$ **[A1]**

(a) ..... [2]

(b) ..... [2]

5. In the figure shown below, $AB \parallel CD$.



(a) Name a pair of similar triangles.
(b) Find the value of x and y.

(a) ΔECD and ΔEBA **[A1]**
(b) $x = 3, y = 15$ **[A1,A1]**

(a) ..... [1]

(b) ..... [2]

---

6. Map A is drawn to a scale of 1 : 60 000.
(a) Find the distance between 2 towns on the map if the actual distance between the 2 towns is 12.6 km.
(b) A lake on the map has an area of 3.7 cm^2. Find the actual area of the lake in km^2.

(a) map distance $= \dfrac{1260000}{60000}$
$= 21$ cm **[A1]**
(b) Area scale = 1 cm^2 : 0.36 km^2 **[M1]**
Actual area $= 3.7 \times 0.36$
$= 1.332$ km^2 **[A1]**

(a) ..... [1]

(b) ..... [2]

7. Given that $\sqrt{\frac{z-y}{y}} = \frac{1}{x}$, express y in terms of x and z.

$\frac{z-y}{y} = \frac{1}{x^2}$ **[M1]**

$zx^2 - yx^2 = y$

$zx^2 = yx^2 + y$

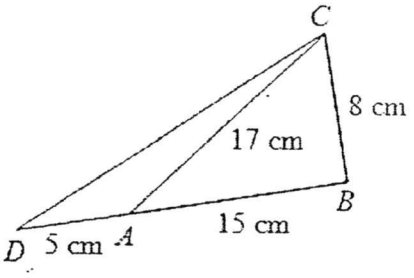
$y(x^2+1) = zx^2$ **[M1]**

$y = \frac{zx^2}{x^2+1}$ **[A1]**

Answer ..... [3]

---

8. In triangle ABC, $AB = 15$ cm, $BC = 8$ cm and $AC = 17$ cm.



(a) Explain why triangle ABC is a right angle triangle.
(b) BA is produced to D and $AD = 5$ cm. Find the length of DC.
(c) Find $\angle DAC$.

(a) $AC^2 = 17^2 = 289$
$AB^2 + BC^2 = 15^2 + 8^2 = 289$ **[M1]**
Since $AC^2 = AB^2 + BC^2$, by pythagoras thereom,
triangle ABC is a right angle triangle **[A1]**

(b) $DC^2 = 20^2 + 8^2$ **[M1]**
$DC = 21.5$ cm **[A1]**

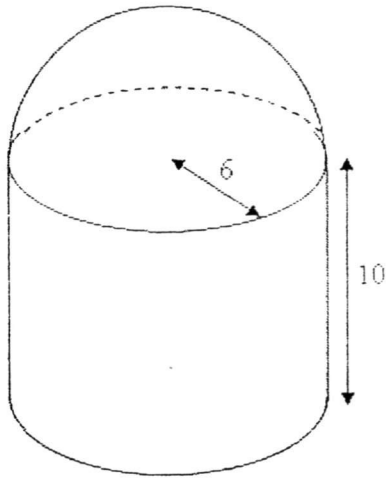
(c) $\angle CAB = \sin^{-1}(\frac{8}{17})$
$= 28.072°$ **[M1]**
$\angle DAC = 180° - 28.072°$
$= 151.9°$ **[A1]**

(a) Answer in the spaces provided [2]

(b) ..... [2]

(c) ..... [2]

9. The iron solid is made up of a hemisphere joined to a cylinder with a radius of 6 cm and a height of 10 cm.



Calculate
(a) the volume of the solid,
(b) the surface area of the solid.

(a) Vol $= \frac{2}{3}\pi(6^3) + \pi(6^2)(10)$ **[M1,M1]**

$= 1580 \text{ cm}^3$ (3sf) **[A1]**

(b) Surface area $= 2\pi(6^2) + 2\pi(6)(10) + \pi(6^2)$ **[M1 for hemisphere, M1 for curved surface]**

$= 716 \text{ cm}^2$ (3sf) **[A1]**

(a) ..... [3]

(b) ..... [3]

10. A box contains 30 balls, of which 14 are yellow, 8 are green and the rest are blue. A ball is drawn at random from the box.

(a) Find the probability that the ball is yellow.

(b) Find the probability that the ball is either blue or green.

(c) Find the number of yellow balls that need to be removed so that the probability of drawing a yellow ball is $\frac{1}{3}$.

(a) $\frac{7}{15}$ **[B1]**

(b) $\frac{8}{15}$ **[B1]**

(c) 2 units – 16 balls
1 unit – 8 balls
Number to be removed = 6 **[B1]**

(a) ..... [1]

(b) ..... [1]

(c) ..... [1]

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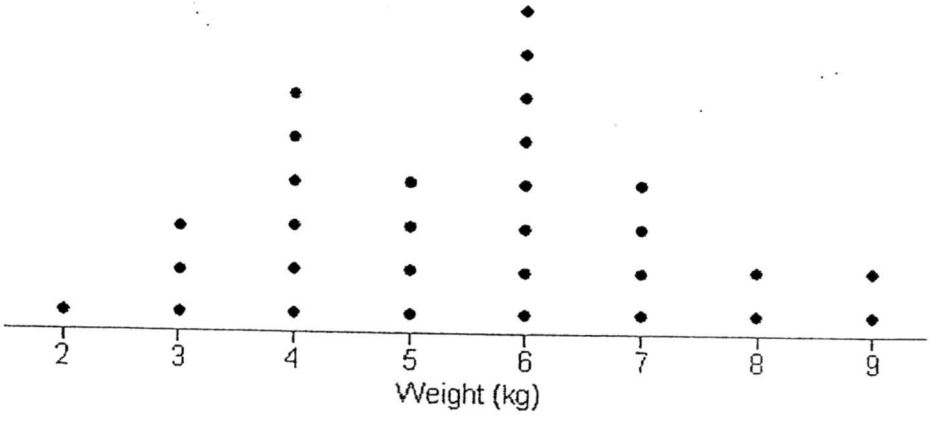
11. The dot diagram below shows the weight of 30 boxes.



(a) Write down the modal weight.

(b) Find the median weight.

(c) If the standard weight of a box is between 3 kg to 7 kg, find the percentage of the boxes that have standard weight.

(a) 6 kg **[B1]**

(b) 6 kg **[B1]**

(c) $\frac{18}{30} \times 100 = 60\%$ **[A1]**

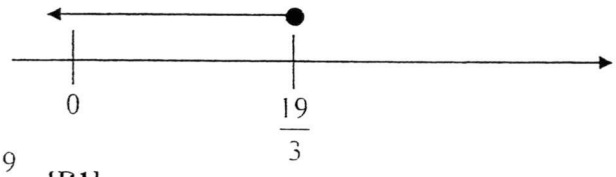
(a) ..... [1]

(b) ..... [1]

(c) ..... [1]

12. **(a)** Solve the inequality $4-3x \geq -15$ and represent its solution on a number line given.
(b) State the
(i) greatest rational number.
(ii) smallest prime number.

(a)



[A1 for solution, A1 for arrow]

(b)(i) $\frac{19}{3}$ **[B1]**

(ii) 2 **[B1]**

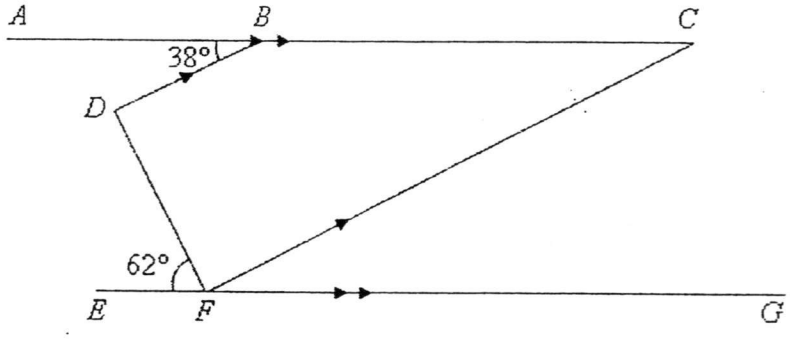
(a) ..... [2]

(b) (i) ..... [1]

(b) (ii) ..... [1]

---

13. In the diagram, the straight line ABC is parallel to EFG and DB is parallel to FC. It is given that $\angle ABD = 38°$ and $\angle DFE = 62°$.



Stating your reasons clearly, find
(a) $\angle BDF$,
(b) $\angle CFG$.

(a) $\angle BDF = 38° + 62°$ **[M1]**
$= 100°$ **[A1]** (alt $\angle$)

(b) $\angle CFG = 38°$ **[B1]** (corres. $\angle$)

(a) ..... [2]

(b) ..... [1]

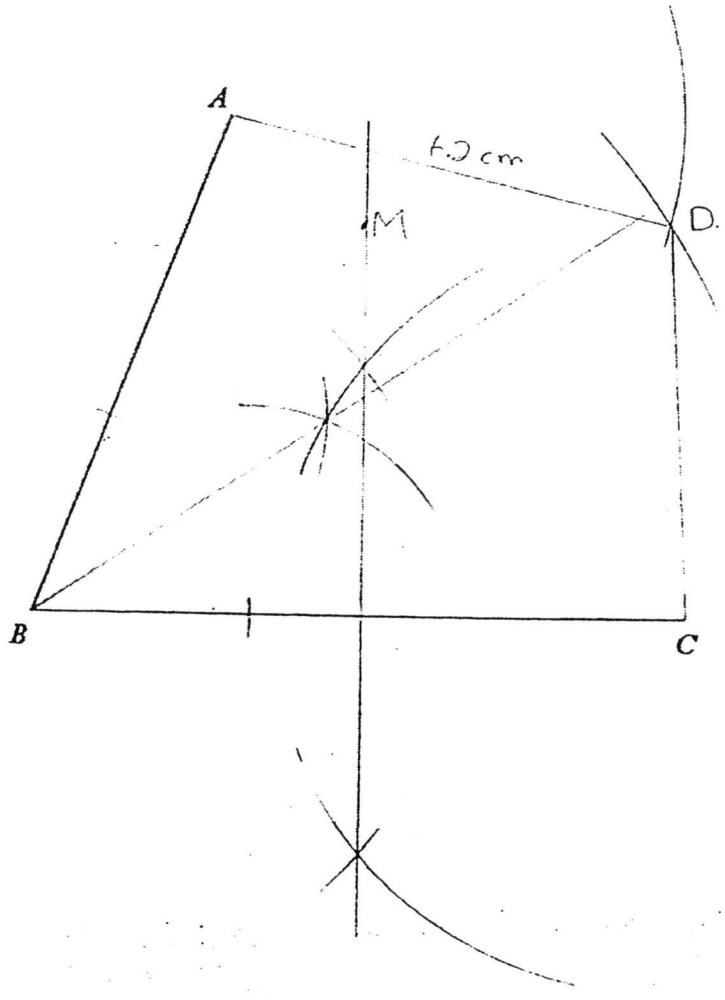
(c)

14. **(a)** Given that $AD = 6.2$ cm and $BD = 10.4$ cm, construct the quadrilateral $ABCD$.

(b) Construct a line which is equidistant from B and C.

(c) Construct another line which is equidistant from AB and BC.

(d) A point M is equidistant from B and C, but is nearer to AB than BC. Mark and label the point M.



(a) Answer in the spaces provided [2]
(b) Answer in the spaces provided [1]
(c) Answer in the spaces provided [1]
(d) Answer in the spaces provided [1]

15. In 2014, the price of a television set is $1000, which was an increase of 8% from 2013.

(a) Find the price of the television set in 2013.

(b) Ahmad bought the television set in 2014 and sold it in 2015 for a profit of 5%. Find the selling price of the television.

(a) price in 2013 $= \frac{1000}{108} \times 100$ **[M1]**

$= \$925.93$ **[A1]**

(b) selling price $= \frac{1000}{100} \times 105$

$= \$1050$ **[A1]**

(a) ..... [2]

(b) ..... [1]

---- END OF PAPER ---