Answer ALL questions on the space provided.

1. (a) Express 2.73638464 to 3 significant figures.
   (b) Express 0.29875 to 2 decimal places.

Answer: (a) _____ [1]

(b) _____ [1]

---

2. A farmer has enough food to feed 90 cows for 40 days. How many cows must he sell so that the food can feed the remaining cows for 60 days?

Answer: _____ cows [2]

---

3 Simplify the following and express it as a single fraction:

$$\frac{3x^2}{yz} \times \frac{6y^2}{21yz} \div \frac{3xy}{14z^2}$$

Answer: _____ [2]

4. Expand and simplify the following
   (a) $(x+3)(x-4)$,
   (b) $(2a+3)^2$.

Answer: (a) _____ [2]

(b) _____ [1]

---

5. Factorise the following completely:
   (a) $x^2 + 4x - 12$
   (b) $2pq + 10rq + p + 5r$
   (c) $4x^2 + 20x + 25$

Answer: (a) _____ [2]

(b) _____ [2]

(c) _____ [1]

6. Solve the following equations:

(a) $8h + 3(h+1) = 6h - 7$

(b) $\frac{3x}{2} - \frac{5}{4} = \frac{2x+3}{3}$

Answer: (a) h = _____ [2]

(b) x = _____ [3]

---

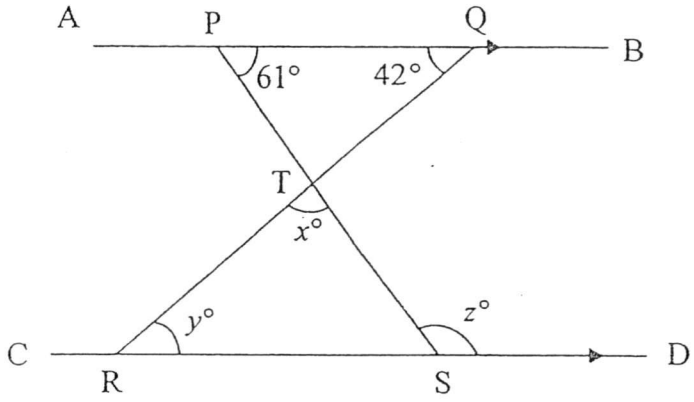
7. Solve the following simultaneous equations:

$$3x + y = 9$$
$$4x - 3y = -1$$

Answer: (a) x = _____

(b) y = _____ [3]

8. Line AB is parallel to line CD. Line PS and line QR are straight lines intersecting at T. Find the values of x, y and z.



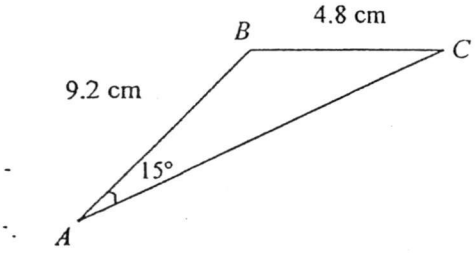
Answer: (a) $x =$ _____ ° [1]

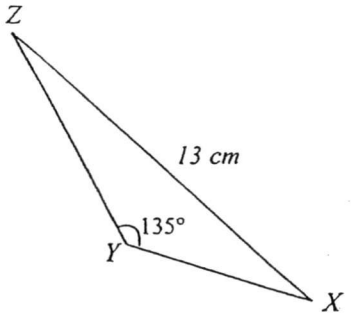
(b) $y =$ _____ ° [1]

(c) $z =$ _____ ° [1]

---

9. In the diagram, ΔABC is congruent to ΔZYX. Find
   (a) the length of YZ,
   (b) $\angle ACB$

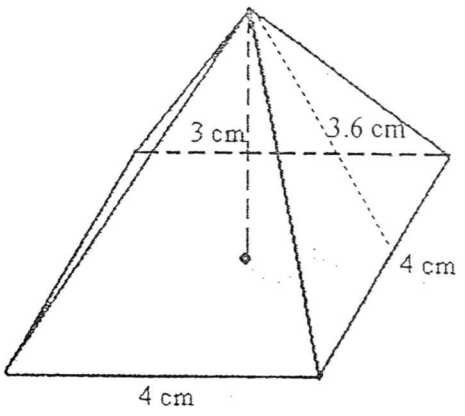




Answer: (a) $YZ =$ _____ cm [1]

(b) $\angle ACB =$ _____ ° [2]

10. (a) Find the volume of the pyramid shown below.
    (b) Find the total surface area of the pyramid.

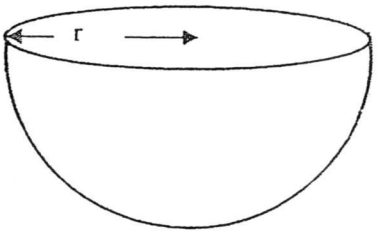


Answer: (a) _____ cm^3 [2]

(b) _____ cm^2 [2]

---

11. A hemisphere has a curved surface area of 308 cm^2. Find the volume of the hemisphere. (Taking $\pi = \frac{22}{7}$)



Answer: _____ cm^3 [4]

12. A basket has 15 unique pears. Their mass in grams are:

146	168	163	175	125
123	155	138	148	168
170	162	168	158	158

(a) In the answer space below, complete the stem and leaf diagram to represent the above information.

Stem	Leaf
12	
13	
14	
15	
16	
17	

Key: 12|3 means 123 grams

(b) Hence, find
(i) the modal mass of pears,
(ii) the median mass of pears and
(iii) the mean mass of pears.

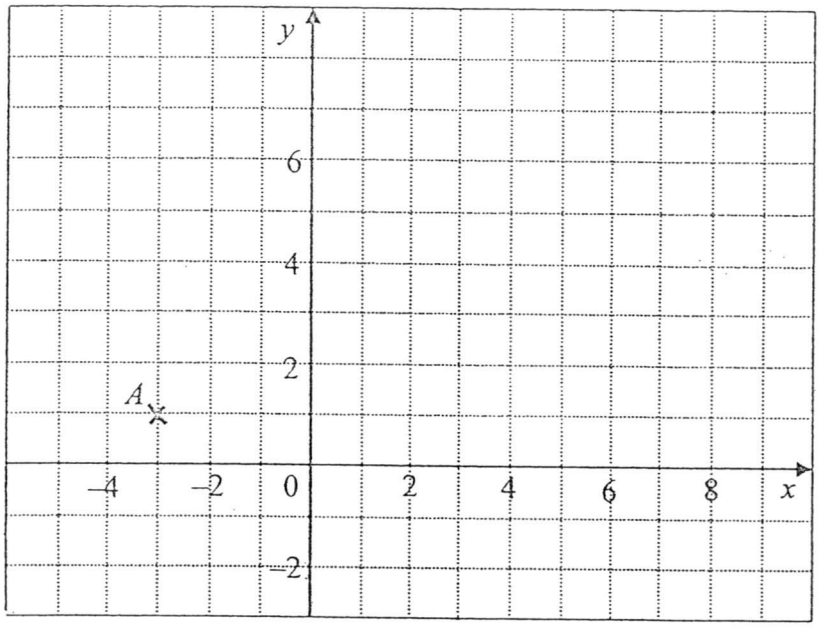
Answer: (a) *Refer to diagram* [2]

(b) (i) _____ g [1]

(ii) _____ g [1]

(iii) _____ g [2]

13. The point A is marked on the grid below.



(a) Write down the coordinates of A.

(b) The coordinates of point B are (7, 6). Mark and label the point B on the grid.

(c) The point $(a\ ,\ 0)$ lies on the line passing through points A and B. Find the value of a.

(d) Calculate the gradient of the line AB.

Answer: (a) A = (_____ , _____) [1]

(b) *Refer to graph* [1]

(c) a = _____ [1]

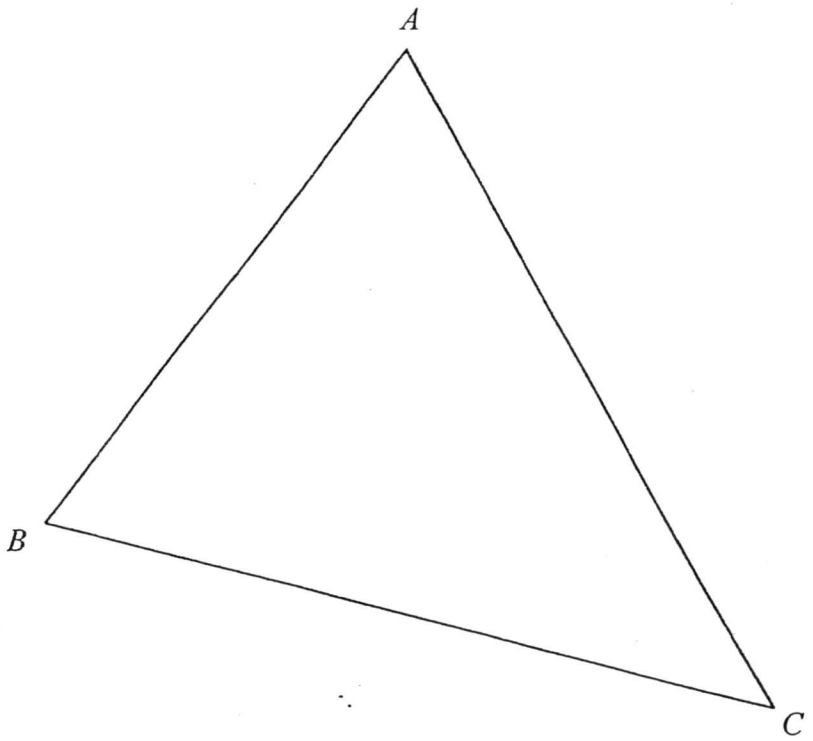
(d) Gradient = _____ [2]

14. A triangle ΔABC is shown in the diagram below.

(a) Measure and write down angle $\angle ABC$.

(b) Construct on the diagram, using only a ruler and a compass,
(i) a perpendicular bisector of AB.
(ii) an angle bisector of $\angle BAC$.

Show all construction lines clearly



Answer: (a) $\angle ABC =$ _____ ° [1]

(b) *Refer to diagram* [2]

~ End of Paper 1 ☺ ~

Bukit Merah Secondary School
End of Year Examination 2013
Secondary 2 Normal Academic

Mathematics Syllabus A (Paper 1)
Marking Scheme

No.	Possible Answers
1	(a) 2.74 [B1] (b) 0.30 [B1]
2	40 days – 90 cows 1 day – 90 x 40 = 3600 cows [M1] 60 days – 3600/60 = 60 cows Number of cows to sell = 90- 60 = 30 [A1]
3	$\frac{3x^2}{yz} \times \frac{6y^2}{21yz} \times \frac{14z^2}{3xy}$ [M1] $= \frac{4x}{y}$ [A1]
4	(a) $x^2 + 3x - 4x - 12$ [M1] $= x^2 - x - 12$ [A1] (b) $4a^2 + 12a + 9$ [B1]
5	(a) Cross method [M1] $(x + 6)(x - 2)$ [A1] (b) $2q(p + 5r) + (p + 5r)$ [M1] $= (2q + 1)(p + 5r)$ [A1] (c) $(2x + 5)^2$ [B1]
6	(a) $8h + 3h + 3 = 6h - 7$ [M1] $5h = -10$ $h = -2$ [A1] (b) $\frac{6x-5}{4} = \frac{2x+3}{3}$ [M1] $3(6x - 5) = 4(2x + 3)$ $18x - 15 = 8x + 12$ [M1] $10x = 27$ $x = 2.7$ [A1]

7	$y = 9 - 3x$ Sub (3) into (1): $4x - 3(9 - 3x) = -1$ [M1] $13x = 26$ $x = 2$ [A1] $y = 3$ [A1]
8	(a) $x = 77^\circ$ [B1] (b) $y = 42^\circ$ [B1] (c) $z = 119^\circ$ [B1]
9	(a) YZ = 9.2 cm (b) ACB = 180 – 135 – 15 [M1] $= 30^\circ$ [A1]
10	(a) Volume = 1/3 x (4x4) x 3 [M1] $= 16\ cm^3$ [A1] (b) Total surface area = (4x4) + 4(0.5x4x3.6) [M1] $= 44.8\ cm^2$ [A1]
11	½ x 4 πr^2 = 308 ½ x 4 x 22/7 x r^2 = 308 [M1] r = 7 cm [A1] Volume of hemisphere = ½ x 4/3 x 22/7 x 7^3 [M1] $= 718.6667 = 719\ cm^3$ [A1]
12	(a)

Stem	Leaf
12	3 5
13	8
14	6 8
15	5 8 8
16	2 3 8 8 8
17	0 5

	Key: 12|3 means 123 grams (b) (i) Mode = 168g (ii) Median = 158 g (iii) Mean = 2325/15 [M1] = 155g
13	(a) A(-3,1) [B1] (b) Refer to graph [B1] (c) a = -5 [B1] (d) Gradient = (6-1)/(7-(-3)) [M1] =0.5 [A1]
14	(a) ABC = 67° (b) Refer to diagram

Answer ALL questions on the writing papers provided.

1. (a) Evaluate $\frac{99}{71} - \sqrt[3]{29}$, giving your answer correct to 2 significant figures. [1]

   (b) Find the HCF of 120 and 204. [2]

---

2. (a) Solve the inequality $3x + 5 > 20$. [1]

   (b) Hence, find the smallest
   (i) prime number that satisfies the equation. [1]
   (ii) perfect square that satisfies the equation. [1]

---

3. (a) It is given that x is directly proportional to y^2 and that $x = 12$ when $y = 2$.
   (i) Find an equation relating y and x. [2]
   (ii) Find the value of y when $x = 27$. [1]

   (b) It is given that p is inversely proportional to $\sqrt{q}$ and that $p = 2$ when $q = 4$.
   (i) Find an equation relating p and q. [2]
   (ii) Find the value of p when $q = 25$. [1]

---

4. The scale of a Singapore map is 1 : 50 000.
   (a) Find the actual length of the Kallang-Paya Lebar Expressway (KPE) that is 18 *cm* long on the map. Express your answer in *km*. [2]

   (b) The actual area of Sentosa Island is 5 km^2. Calculate the area of the island on the map in cm^2. [2]

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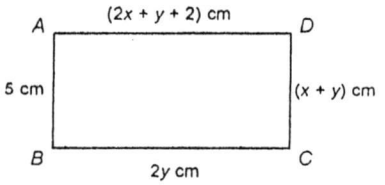
5. The diagram shows a rectangle $ABCD$.



   (a) Form two simultaneous equations relating the sides of the rectangle. [2]

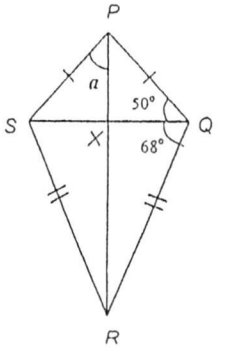
   (b) Solve the simultaneous equations from (a) to find the values of x and y. [3]

   (c) Hence, find the length of the rectangle. [1]

6. (a) The interior angles of a pentagon are 100°, 95°, $2x$°, x° and $2x$° respectively. Find the value of x. [3]

   (b) Find the value of an exterior angle of a regular nine-sided polygon. [1]

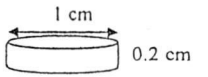
   (c) The diagram below shows a kite $PQRS$.

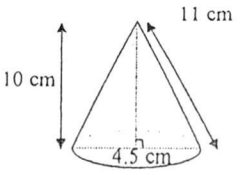


   (i) Identify and write down 1 pair of congruent triangles. [1]
   (ii) Given that $\angle PQS = 50°$ and $\angle RQS = 68°$, find the value of a. [2]

---

7. Mr Teng has 500 gold coins, 1 cm in diameter and 0.2 cm thick. He intends to make a decorative item in a conical shape of height 10 cm and diameter 4.5 cm.



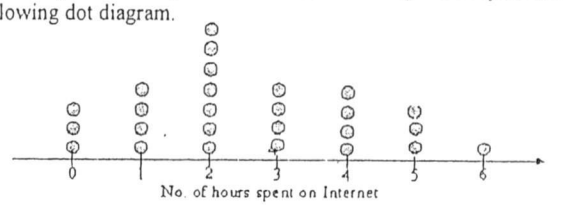


   (a) How many gold coins must he melt in order to make the decorative item? [3]

   (b) He wants to have a coating all around the decorative item. Find the total surface area he needs to coat. [3]

---

8. (a) A group of adults was surveyed on the amount of time they spent on the Internet on a particular day. The results of the survey were represented in the following dot diagram.



Using the dot diagram, answer the following questions.

(i) Find the modal length of time spent on the Internet. [1]

(ii) Calculate the median length of time they spent on the Internet. [1]

(iii) Calculate the mean length of time they spent on the Internet. [2]

(iv) Calculate the percentage of adults who spent more than 4 hours on Internet. [2]

(b) The table below shows the distribution of the circumference of the trees along certain stretch of road.

Calculate an estimate of the mean circumference of the trees. [2]

Circumference (cm)	Frequency
$165 < x \leq 175$	7
$175 < x \leq 185$	16
$185 < x \leq 195$	5

---

9. **Answer the entire question on a single sheet of graph paper.**

(a) The table below shows the values of $y = 2x - 5$.

x	0	2	4
y	-5	-1	p

(i) Calculate the value of p. [1]

(ii) Using a scale of 2 cm to represent 1 unit on x-axis and 2 cm to represent 2 units on the y-axis, draw the graph of $y = 2x - 5$ for $0 \leq x \leq 4$. [3]

(b) The table below shows the values of $y + 3x = 0$.

x	0	2	4
y	0	-6	-12

[2]

On the same axes, draw the graph of $y + 3x = 0$.

(c) From the graph, find the solution to the simultaneous equations of $y = 2x - 5$ and $y + 3x = 0$. [1]

~ End of Paper 2 ☺ ~

Bukit Merah Secondary School
End of Year Examination 2013
Secondary 2 Normal Academic

Mathematics Syllabus A (Paper 2)
Marking Scheme

No.	Possible Answers
1	(a) -1.7 [B1] (b) Either ladder method / tree method [M1] HCF = 12 [A1]
2	(a) $x > 5$ [B1] (b) (i) Smallest prime number = 7 [B1] (ii) Smallest perfect square = 9 [B1]
3	(a) (i) $12 = k(2)^2$ $k = 3$ [M1] $x = 3y^2$ [A1] or $y^2 = 1/3x$ (ii) $y = \pm 3$ [B1] (b) (i) $2 = k/\sqrt{4}$ $k = 4$ [M1] $p = 4/\sqrt{q}$ [A1] (ii) p = 0.8 or 4/5 [B1]
4	(a) 1 cm: 50 000 cm 1 cm: 0.5 km [M1] Actual length = 0.5 x 18 = 9 km [A1] (b) 1 cm^2 : 0.5^2 km^2 1 cm^2 : 0.25 km^2 [M1] Area on map = 5 / 0.25 = 20 cm^2 [A1]

5	(a) $2x + y + 2 = 2y$ [B1] $x + y = 5$ [B1] (b) $x + y = 5$ ----{1} $2x - y = -2$ --- {2} {1} + {2} : $3x = 3$ [M1] $x = 1$ [A1] $y = 4$ [A1] (c) Length = 2 x 4 = 8 cm [B1]
6	(a) Sum of interior angles of pentagon = (5-2) x 180 = 540 ° [M1] $100 + 95 + 2x + x + 2x = 540$ [M1] $5x = 345$ $x = 69°$ [A1] (b) Exterior angle of 9 sided polygon = 360 / 9 = 40 ° [B1] (c) (i) Any congruent pairs: SPX = QPX, RSX = RXQ [B1] (ii) $a = 180 - 90 - 50$ [M1] = 40 ° [A1]
7	(a) Volume of 1 gold coin = 3.142 x 0.5^2 x 0.2 [M1] = 0.1570 cm^3 Volume of decorative item = 1/3 x 3.142 x 2.25^2 x 10 [M1] = 53.01 cm^3 No. of coins needed = 53.01 / 0.1570 = 338 coins [A1] (b) Total surface area of decorative item = 3.142 x 2.25^2 [M1] + 3.142 x 2.25 x 11 [M1] = 93.7 cm^2 [A1]
8	(a) (i) Mode = 2 hours [B1] (ii) Median = 2 hours [B1] (iii) Mean = 67/26 [M1] = 2.58 hours [A1] (iv) Percentage of students who spent more than 4 hours = 4/26 x 100 [M1] = 15.4% [A1] (b) Estimate total = (7 x 170) + (16 x 180) + (5 x 190) [M1 – middle value] = 5020 Estimate mean = 5020 / 28

	= 179 [A1]
9	(a) (i) $p = 3$ [B1] (ii) Correct scale [B1] Correct points [B1] Correct graph [B1] (b) Correct points [B1] Correct graph [B1] (c) $x = 1$ and $y = -3$ [B1]