BEDOK NORTH SECONDARY SCHOOL

Vision :Creative life-long learners ; morally upright , caring and loyal
Mission :To develop pupils' potential to the fullest through quality programmes and guidance of teachers, within a caring school community.

END OF YEAR EXAMINATION 2010

Name	Reg.No.	Class

MATHEMATICS **4016/01**

PAPER 1 **Date: 5 OCT 2010**

Sec One Express **1 hour 30 minutes**

Candidates answer on the Question Paper

READ THESE INSTRUCTIONS FIRST

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

Answer **all** 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.
Calculators should be used where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 60.

For Examiner's Use
60

This document consists of 10 printed pages

Setter: Mr Alvin Ho and Mdm Tay PL

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Answer **all** the questions

For Examiner's Use

1. Express 632.7739 to

(a) the nearest whole number,

(b) 2 decimal places,

(c) 4 significant numbers.

Answer (a) ..... [1]

(b)..... [1]

(c)..... [1]

For Examiner's Use

2. Arrange the following numbers in descending order.

$$3.8\dot{2},\quad 3\frac{4}{5},\quad 3.8,\quad 3\frac{3}{10}$$

Answer .....[2]

3. A flashing bulb on a Christmas tree flashes once every 10 seconds. Another bulb flashes once every 15 seconds and a third one flashes every 20 seconds. If they are flashing together now, how long will it take for the three bulbs to flash together again?

Answer ..... [2]

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4. (a) Express 324 as a product of its prime factors.

(b) Hence, evaluate $\sqrt{324}$.

(c) Find the **smallest** value of n, such that $168n$ is a multiple of 324.

Answer (a).....[2]

(b).....[1]

(c).....[3]

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5. Evaluate the following, showing **ALL** workings clearly.

(a) $\dfrac{(-4)^3 \times (-3)}{(-100)}$,

(b) $\dfrac{-(-2)+\frac{2}{3}}{1+(-\frac{3}{4})\times 4}$.

Answer (a) .....[2]

(b) .....[2]

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6. (a) Express $2\frac{1}{3} : \frac{7}{9}$ as a ratio in the simplest form.

(b) In a cake, the ratio of the masses of cocoa : butter : other ingredients is 3 : 2 : 7. The mass of cocoa in the cake is 127.5 g. Find

(i) the mass of other ingredients in the cake,

(ii) the mass of the cake.

Answer (a)..... [1]

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

(ii) .....g..[2]

7. There are 900 students in a boarding school of which 25% of them are Americans, 40% are British and the rest are Australians and New Zealanders.

(a) Find the number of Australians and New Zealanders in the boarding school.

Given that 20% of the number in part (a) are Australians and the remaining are New Zealanders.

(b) How many New Zealanders are there in the boarding school?

Answer (a).....[2]

(b).....[2]

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8. Every morning, Aslam takes 50 minutes to travel to school by bus.

(a) If Aslam reaches his school at 7.20 am, what time does he board the bus?

(b) If the average speed of the bus is 42 km/h, what is the distance between his home and his school?

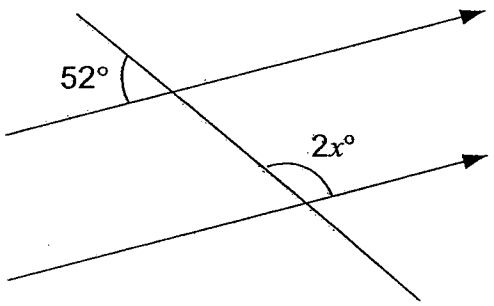
(c) One day, Aslam decides to take a cab to work. If the average speed of the cab is 70 km/h, how much faster will the journey be? Express your answer in minutes.

Answer (a).....[1]

(b).....km [1]

(c).....mins [2]

9. Find the value of x in the figure. State all reasons clearly.



Answer .....[3]

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10. (a) Simplify $2(2x-3y)-5(x-2y)$

(b) Express as a single fraction in its simplest form $1+\frac{x-3}{2}+\frac{2(x-2)}{3}$

(c) Solve the equation $\frac{1}{x+1}=\frac{3}{2x-3}$

Answer (a) .....[2]

(b).....[2]

(c) x = ... [2]

11. Given that $F = 3$, $r = 2$ and $s = -5$, find the value of the following expressions:

(a) $2F-rs$

(b) $\frac{5r^2}{s}$

Answer (a) .....[2]

(b) .....[2]

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For Examiner's Use

12. Factorise completely

(a) $48ab - 21bc$

(b) $9ax - 27bx + 5ay - 15by$.

Answer (a) ..... [2]

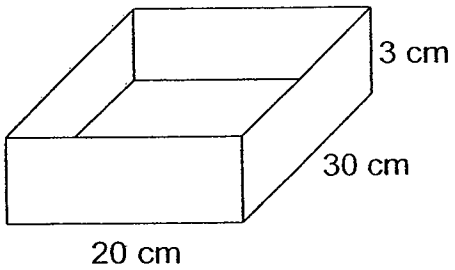
(b) ..... [2]

For Examiner's Use

13. The diagram shows a rectangular **open** cardboard box which measures 20 cm by 30 cm by 3 cm. The open box is filled with sand. Calculate

(a) the volume of sand in the box.

(b) the area of the cardboard in contact with sand..



Answer (a).....cm^3 [2]

(b).....cm^2 [2]

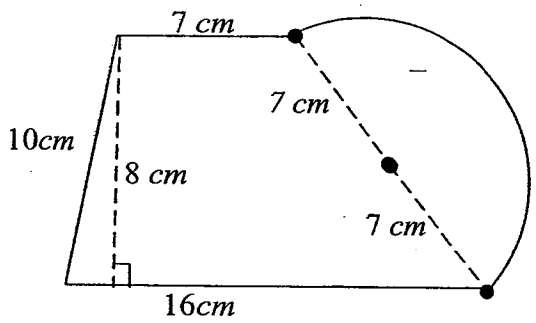
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14. The diagram below shows a figure that is made up of a trapezium and a semicircle of radius 7 *cm*. Find

(a) the perimeter of the figure.

(b) the area of the figure



For Examiner's Use

Answer (a).....*cm* [2]

(b).....cm^2 [2]

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15. A group of 40 students were asked on the number of books they read in the month of March. The responses are shown below.

Number of books

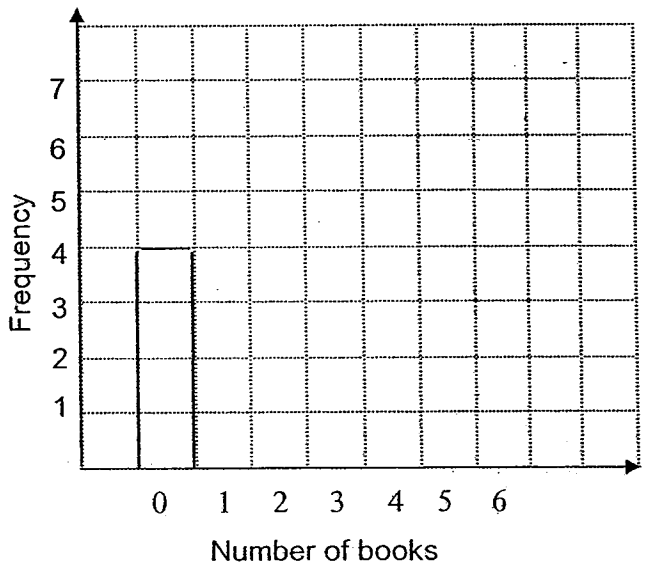
5	0	1	3	4	4	2	6
0	1	4	1	3	6	5	1
4	3	0	2	6	0	5	5
2	6	1	5	4	5	2	3
6	2	1	2	2	5	3	3

(a) Complete the frequency table below.

Number of books	Tally	Frequency
0	||||	4
1		
2		
3		
4		
5		
6		
	Total	40

[2]

(b) In the space provided, construct a histogram to represent the data in the frequency table above.



[2]

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(c) Calculate the total number of books read by the class.

Answer (c) ..... [2]

END OF PAPER
Please CHECK your WORK

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Markers' Script (BNSS EoY Exam, Math, Paper 1, Exp)

1a) Ans: 633 **[B1]**
1b) Ans: 632.77 **[B1]**
1c) Ans: 632.8 **[B1]**

2)

Ans: $3.\dot{8}$, $3.8\dot{2}$, $3\frac{4}{5}$, $3\frac{3}{10}$

[B1] – for any 3 consecutive correct arrangements

otherwise

[B2] – for all 4 consecutive correct arrangements

3)

5	10	15	20
2	2	3	4
2	1	3	2
3	1	3	1
	1	1	1

[M1]

LCM of 10, 15 and 20 = 5x2x2x3

= 60 **[A1]**

The bulbs next flash together after 60 seconds (or 1 minute).

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4a)

2	324
2	162
3	81
3	27
3	9
3	3
	1

[M1]

Ans: $324 = 2^2 \times 3^4$ **[A1]**

4b) Ans: $\sqrt{324} = 2 \times 3^2 = 18$ **[B1]**

4c) $168 = 2^3 \times 3 \times 7$ **[M1]**

$\therefore$ LCM of 168 and 324 $= 2^3 \times 3^4 \times 7 = 4536$ **[M1]**

Hence,

$$168n = 4536$$

$$n = \frac{4536}{168}$$

$$= 27$$ **[A1]**

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5a)

$$\frac{(-4)^3 \times (-3)}{(-100)} = \frac{-64 \times (-3)}{-100}$$

$$= \frac{192}{-100}$$

$$= -1.92 \quad = --1\frac{23}{25}$$

[M1][A1]

5b)

$$\frac{-(-2) + \frac{2}{3}}{1 + (-\frac{3}{4}) \times 4} = \frac{2\frac{2}{3}}{1 + (-3)}$$

$$= \frac{2\frac{2}{3}}{-2}$$

$$= -\frac{4}{3} = -1\frac{1}{3}$$ **[M1][A1]**

6a)

$$2\frac{1}{3} : \frac{7}{9}$$

$$= \frac{7}{3} : \frac{7}{9}$$

$$= \frac{21}{9} : \frac{7}{9} = 21 : 7$$

Ans = 3 : 1 **[A1]**

6bi) Mass of other ingredients: $\frac{7}{3} \times 127.5 = 297.5\text{g}$ **[B1]**

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6bii) Mass of the cake: $\frac{12}{3} \times 127.5 = 510\text{g}$ **[B1]**

7a) Percentage of Australian and New Zealander students:

$100\% - 25\% - 40\% = 35\%$ **[M1]**

Number of Australian and New Zealander students:

$900 \times 35\% = 315$ **[A1]**

7b) Percentage of New Zealanders from answer in part (a):

$100\% - 20\% = 80\%$ **[M1]**

Number of New Zealanders in the boarding school:

$315 \times 80\% = 252$ **[A1]**

8a) Ans: 6.30 am **[B1]**

8b) dist. = spd x time

$= 42 \times \frac{5}{6}$

$= 35\text{km}$ **[B1]**

8c) time = dist / spd

$= \frac{35}{70}$

$= 0.5 \text{ hrs} = 30 \text{ mins}$ **[M1]**

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Ans: The journey would be (50 – 30) = 20 mins faster **[A1]**

9)

$180^\circ - 52^\circ = 2x^\circ$ **[M1]**

(Angles on a st, line) **[M1]**

$128^\circ = 2x^\circ$

$x^\circ = \frac{128^\circ}{2} = 64^\circ$ **[A1]**

10a)

$2(2x - 3y) - 5(x - 2y) = 4x - 6y - 5x + 10y$ **[M1]**

$= -x + 4y$ **[A1]**

10b)

$1 + \frac{x - 3}{2} + \frac{2(x - 2)}{3} = \frac{6 + 3(x - 3) + 4(x - 2)}{6}$

[M1]

$= \frac{6 + 3x - 9 + 4x - 8}{6}$

$= \frac{7x - 11}{6}$ **[A1]**

10c) $2x - 3 = 3(x + 1)$ **[M1]**

$2x - 3 = 3x + 3$

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$$3x - 2x = -3 - 3$$

$$x = -6 \qquad \textbf{[A1]}$$

11a) $2(3) - (2)(-5) = 6 + 10$ **[M1]**

$= 16$ **[A1]**

11b) $\dfrac{5(2)^2}{-5} = \dfrac{20}{-5} = -4$ **[M1][A1]**

12a) $48ab - 21bc = 3b(16a - 7c)$ **[B2]**

12b) $9ax - 27bx + 5ay - 15by$

$= 9x(a - 3b) + 5y(a - 3b)$ **[M1]**

$= (a - 3b)(9x + 5y)$ **[A1]**

13a) Volume of sand:

L x B x H = 20 x 30 x 3 **[M1]**

$= 1800\ cm^3$ **[A1]**

13b) Area of cardboard in contact with sand:

2(20 x 3) + 2(30 x 3) + (20 x 30) **[M1]**

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$= 120 + 180 + 600$

$= 900\ cm^2$ **[A1]**

14a)

Perimeter of the figure:

$(10 + 7 + 16) + \frac{2\pi(7)}{2}$ **[M1]**

$= 33 + 21.994$

$= 54.994$

$= 55.0$ cm (3s.f) **[A1]**

14b)

Area of the figure:

$\frac{1}{2}(7 + 16)8 + \frac{\pi(7)^2}{2}$ **[M1]**

$= 92 + 76.979$

$= 168.979$

$= 168\ cm^2$ **[A1]**

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15c) Total number of books read by the class:

$(4 \times 0) + (1 \times 6) + (2 \times 7) + (3 \times 6) + (4 \times 5) + (5 \times 7) + (6 \times 5)$ **[M1]**

$= 123$ books **[A1]**

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END OF YEAR EXAMINATION 2010

Name	Reg.No.	Class

MATHEMATICS **4016/02**

PAPER 2 **Date: 6 OCT 2010**

Sec One Express **1 hour 30 minutes**

Additional Materials : Answer Paper and Graph Paper

READ THESE INSTRUCTIONS FIRST

Write your name, class register number and class on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a pencil for any diagrams or graphs
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For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 60.

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Setter: Mdm Tay PL

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Answer **all** the questions

1 The original monthly expenditure of Mr Tan was 70% of his monthly income
Mr Tan's monthly expenditure was $3125 after he had reduced it by 10%. .

(a) Find the original monthly expenditure. [2]

(b) Find his monthly income. [2]

2

(a) Jane cycled from home at an average speed of 8.4 km/h to the Post Office which was 5.6 km away. If she arrived at the Post Office at 12 15, what time did she leave her house? [2]

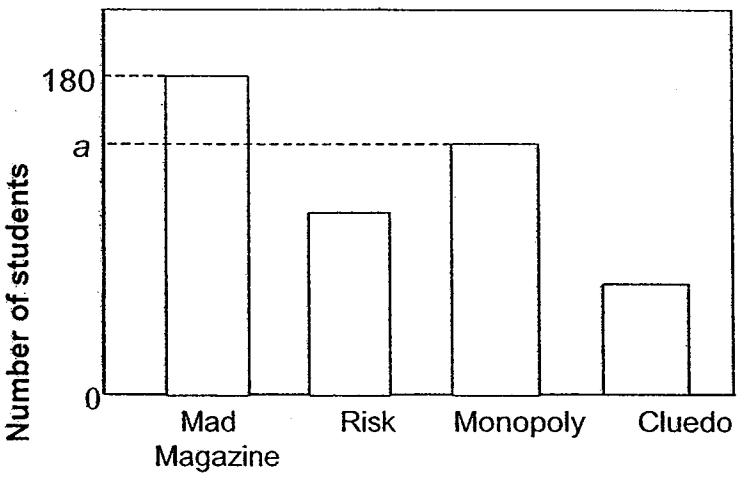
(b) A motorist travels 54 km in $1\frac{1}{2}$ hours. He continues his journey at a constant speed of 72 km/h for another $\frac{1}{2}$ hours. Calculate

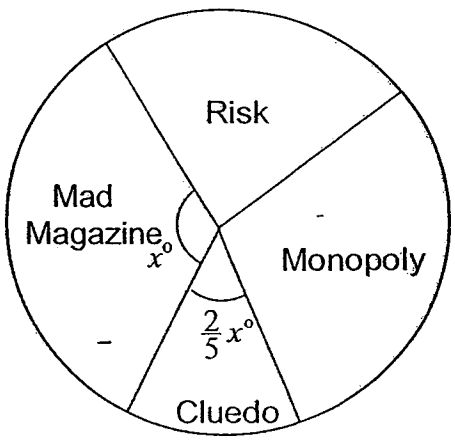
(i) the average speed of the motorist for the first $1\frac{1}{2}$ hours, [1]

(ii) the average speed of the motorist for the whole journey. [3]

---

3. A toy departmental store carried out a survey with some children to find out their favourite games. The results of the survey were presented using a bar chart and a pie chart as shown below.





Favourite games

(a) Given that the total angles of the sectors for Mad Magazine and Cluedo is 168°, find the value of x. [2]

(b) Hence, calculate the number of students who participated in the survey. [2]

(c) Given that the angles of the sectors in the pie chart for Risk and Monopoly are in the ratio of 7 : 9 respectively, calculate the value of a in the bar chart. [3]

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4 (a) David scored x marks for his PSLE examination.

Edwin scored 80 marks less than what David had scored.

Frank's marks is twice that of Edwin's marks.

(i) Write, in terms of x, Frank's marks. [1]

If the three boys scored a total of 980 marks,

(ii) Write an equation in terms of x. [1]

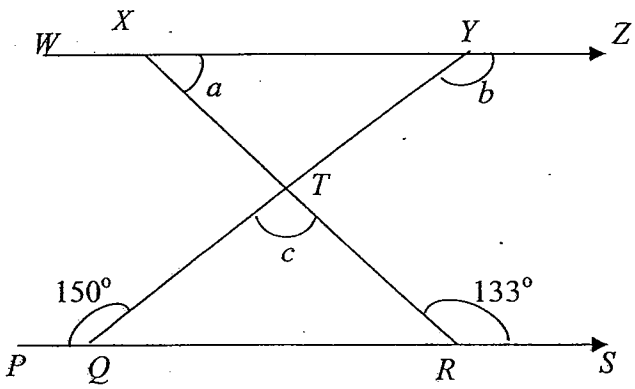
(iii) Solve the equation above to find the value of x. [2]

(b) (i) Evaluate $\frac{a^2+2b^3}{3c-bc}$, given that $a=-1$, $b=-2$ and $c=1$. [2]

(ii) Solve the equation $\frac{7-3x}{2}-\frac{3-x}{5}=5\frac{1}{2}$. [3]

---

5 In the figure below, WZ//PS.



Find the values of

(i) angle a, [2]

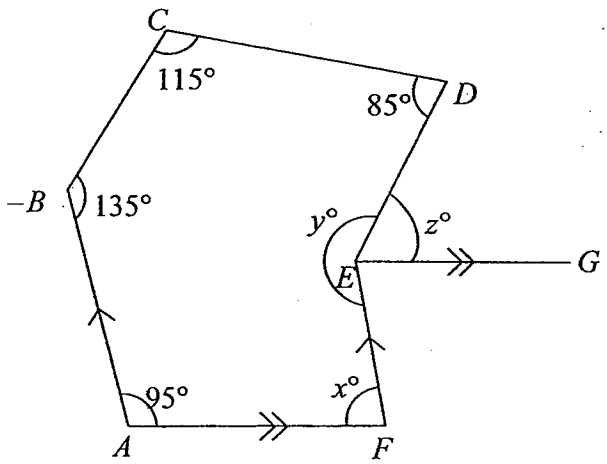
(ii) angle b, [2]

(iii) angle c.. [3]

State all reasons clearly.

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6 (a) In the diagram below, AB is parallel to FE, AF is parallel to EG, $\angle ABC = 135°$, $\angle BCD = 115°$, $\angle CDE = 85°$, $\angle FAB = 95°$



Find the values of

(i) x, [2]

(ii) y, [2]

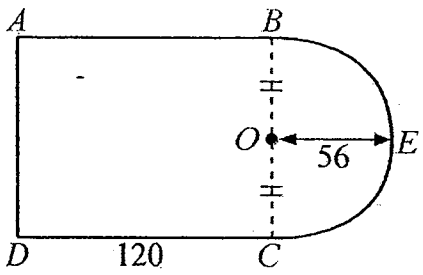
(iii) z. [2]

State all reasons clearly.

(b) A polygon has n sides. Three of its exterior angles are $70°$, $25°$ and $15°$ while the remaining exterior angles are each equal to $50°$. Find n. [2]

---

7 The figure below shows a rectangle $ABCD$ which is joined to a semi-circle BEC. The mid-point of BC is O, $OB = OC$. All measurements in the diagram are in cm.



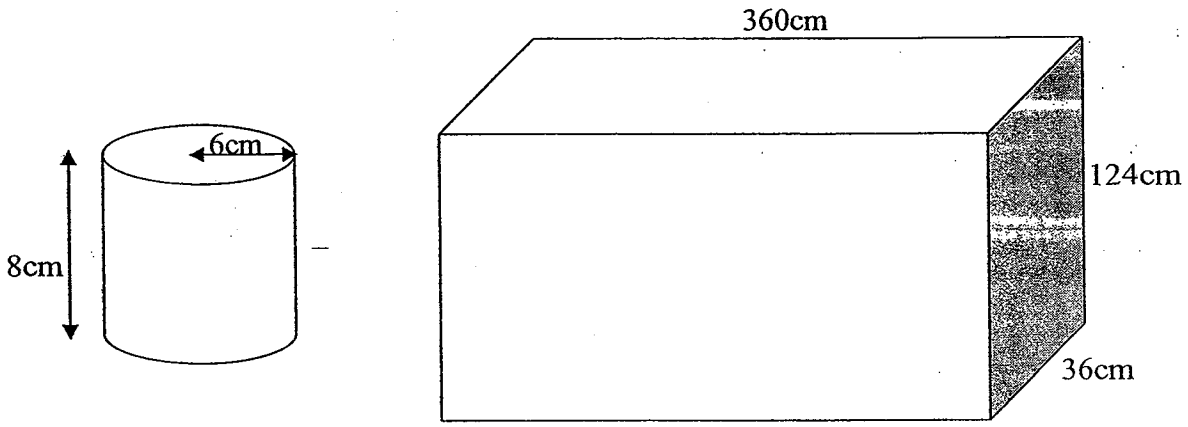
(a) Find the perimeter of the whole figure $ABECD$, [2]

(b) Find the area of the whole figure $ABECD$. [2]

(Take $\pi = \frac{22}{7}$.)

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8 The dimensions of an empty tank are 360 *cm* by 36 *cm* by 124 *cm*.



(a) Find the volume of the empty tank, giving your answer in m^3. [2]

(b) An open cylindrical cans of height 8 *cm* and radius 6 *cm* is used to fill water into the empty tank. Find the volume of the can, giving your answer in m^3.
(Take π=3.142). [2]

(c) How many cans of water are required to fill the tank completely? [2]

---

9 ***Answer the whole of this question on a piece of graph paper.***

The table below gives some values of x and the corresponding values of y of a straight line of equation $y = -\frac{1}{2}x + 4$.

x	-2	0	8
y	5	a	0

(a) Find the value of *a*. [1]

(b) Using a scale of 2 *cm* to 1 unit for both x-axis and y-axis, draw the graph of the equation for $-2 \le x \le 8$ and $-1 \le y \le 5$. [3]

(c) From your graph, show that the gradient is $-\frac{1}{2}$. [2]

(d) On the same axes, draw the straight line graph of $y = \frac{3}{2}x$. [2]

(e) Write down the coordinates of the point of intersection of the two lines. [1]

End of Paper
Please CHECK your WORK

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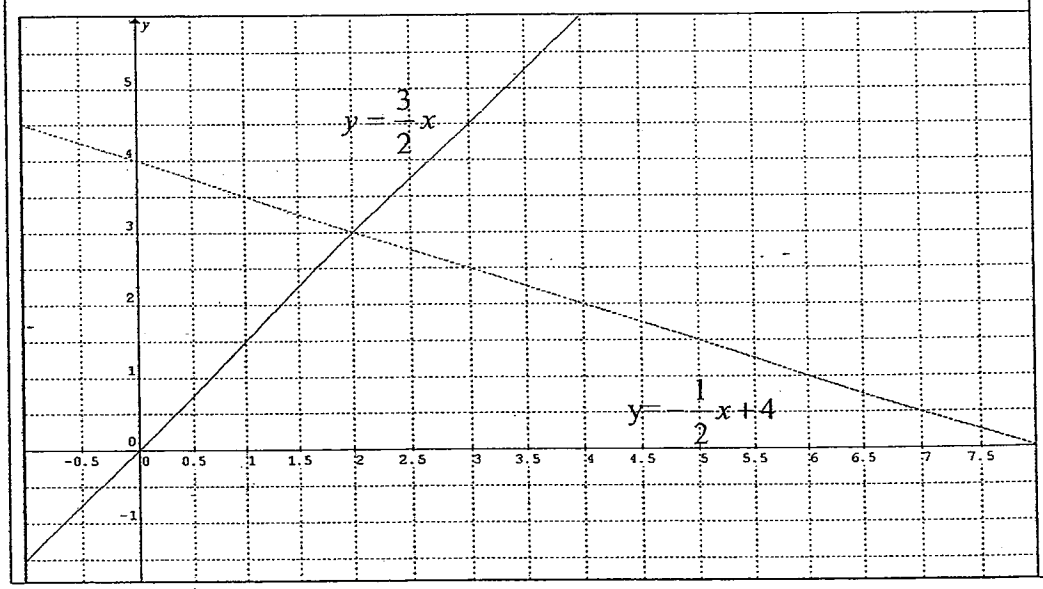
EOY 2010
Mathematics Sec 1E
(60 marks) – 90 minutes

Solutions	Marks
1a) 90% ---- \$3125 100% --- $\frac{100}{90}\times 3125$ Original monthly expenditure = \$ 3472.22 b) 70% ---- \$3472.22 100% --- $\frac{3472.22}{70}\times 100$ Monthly income = \$ 4960.32	M1, A1 M1, A1
2a) Time taken = 40mins Time left = 11 35hr bi) Average speed for 1.5h = 54/1.5 = 36 km/h ii) Distance in 2nd part of journey = $72\times\frac{1}{2}$ = 36 km Average speed for whole journey = $\frac{54+36}{1\frac{1}{2}+\frac{1}{2}}$ = 45 km/h	M1, A1 B1 M1 M1, A1
3a) $x+\frac{2}{5}x=168$ $x=120°$ b) $120° ---180 students$ $360° ---540 students$ Total number of students = 540 c) Number of students in Cluedo = $\frac{2}{5}\times 180$ = 72 Number of students in Risk and Monopoly = 540-180-72 = 288 Number of students in Monopoly = $\frac{9}{16}\times 288$ = 162	M1, A1 M1, A1 M2, A1

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4ai) Frank's marks = $2(x-80)$ ii) $2(x-80)+(x-80)+x=980$ $4x-240=980$ iii) $x=305$	B1 B1 M1, A1
4bi) $\frac{a^2+2b^3}{3c-bc}=\frac{(-1)^2+2(-2)^3}{3(1)-(-2)(1)}$ $=-3$	M1, A1
bii) $\frac{7-3x}{2}-\frac{3-x}{5}=5\frac{1}{2}$ $5(7-3x)-2(3-x)=55$ $35-15x-6+2x=55$ $13x=-26$ $x=-2$	M2, A1
5i) $\angle a=180^\circ-133^\circ$ (int $\angle$, WZ//PS) $=47^\circ$ ii) $\angle b=150^\circ$ (alt $\angle$, WZ//PS) iii) $\angle c=133^\circ-30^\circ$ (ext $\angle of\ \Delta$)) $=103^\circ$	B1 (reason) B1 B1 (reason) B1 M1, B1 (reason), B1
6ai) $\angle x=180^\circ-95^\circ$ (int $\angle$, AB//FE) $=85^\circ$ ii) Sum of interior angle of hexagon = $(6-2)180^\circ$ $=720^\circ$ $\angle y=720^\circ-85^\circ-95^\circ-135^\circ-115^\circ-85^\circ$ ($\angle$ sum of polygon) $=205^\circ$ iii) $\angle FEG=85^\circ$ (alt $\angle$, AF//EG) $\angle z=360^\circ-205^\circ-85^\circ$ ($\angle$ at a point) $=70^\circ$ b) $(n-3)50^\circ+70+25^\circ+15^\circ=360^\circ$ $n-3=5$ $n=8$	B1 (reason) B1 M1, A1 M1, A1 M1, A1

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7a) Circumference of semicircle $= \pi \times 56$ $= 176$ cm Perimeter = 120+120+112+176 = 528 cm b) Area of whole figure $= \frac{\pi \times 56^2}{2} + (120 \times 112)$ $= 18\,368$ cm^2	M1, A1 M1, A1
8a) Volume of tank $= 360 \times 124 \times 36$ $= 1607040$ cm^3 $= 1.61$ m^3 b) Volume of can $= \pi \times 6^2 \times 8$ $= 904.896$ cm^3 $= 0.000905$ m^3 c) Number of cans $= \frac{1.60704}{0.000904896}$ ≈ 1775	M1, A1 M1, A1 M1, A1
9a) a = 4 b) see graph c) see graph e) Coordinate of point of intersection = (2, 3)  	B1 B3 B2 B1

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