SIGLAP SECONDARY SCHOOL

Go forth with wisdom and courage

Mathematics 4016/2

End-of-Year Examination 2011

Secondary One Express

Name : _____ ( ) Date : 14 Oct 2011

Class : _____ Duration : 1 h 30 min

Additional Materials: Answer Papers
Plain Paper (1sheet)
Graph Paper (1sheet)

READ THESE INSTRUCTIONS

Write your name and index number on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
Write your answers on the answer space provided.
Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.
At the end of the examination, fasten all your work together securely.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 60.
The use of an electronic calculator is expected, where appropriate.
You are reminded of the need for clear presentation in your answers.

Score	/ 60	Parent's Signature	Date

Do not turn the pages until you are told to do so

This paper consists of 6 printed pages and 0 blank page

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Answer ALL questions.

1. (a) Bus Service A leaves the Pasir Ris Interchange every 3 minutes. Bus Service B leaves the Pasir Ris Interchange every 5 minutes and Bus Service C leaves the Pasir Ris Interchange every 8 minutes. If all the three bus services first leave the bus interchange at 06 00, at what time would the three buses next leave the interchange together? [3]

(b) Mrs Tan has 3 pieces of ribbons measuring 120 cm, 192 cm and 252 cm respectively. She wants to cut the ribbons into smaller pieces of equal lengths with no remainders.

(i) Find the greatest possible length of each of the smaller pieces of ribbons. [2]

(ii) How many such smaller pieces of ribbons can she get from the original 3 pieces of ribbons? [1]

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2. Given that $x = -1$, $y = 4$ and $z = 3$, find the value of the following:

(a) $(xy)^2 - 8xz$ [2]

(b) $\frac{xy}{z} - \frac{yz}{x} + \frac{xz}{y}$ [2]

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3. Simplify the following:

(a) $\frac{x+y}{4} - \frac{2x-y}{5}$ [2]

(b) $\frac{2(m-1)}{3} + \frac{3(2m-3)}{4}$ [2]

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4. Solve the following equations:

(a) $2x-[9-3(4x-7)]=36$ [3]

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

5. A train traveled a distance of 625 km in 5 hours and then without stopping, traveled a further distance of 240 km at an average speed of 100 km/hr.

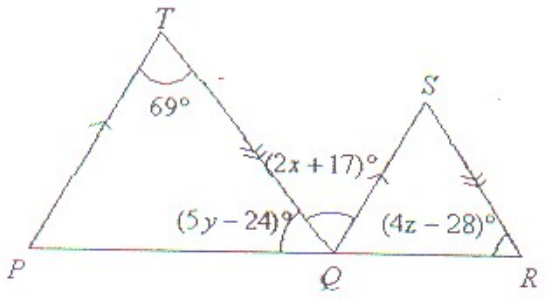
Calculate:

(a) the average speed for the 1st part of the journey. [1]

(b) the time taken, in *hours* and *minutes*, for the second part of the journey. [2]

(c) the average speed for the whole journey. [2]

6. In the diagram below, PQR is a straight line and TQ is the angle bisector of $\angle PQS$.



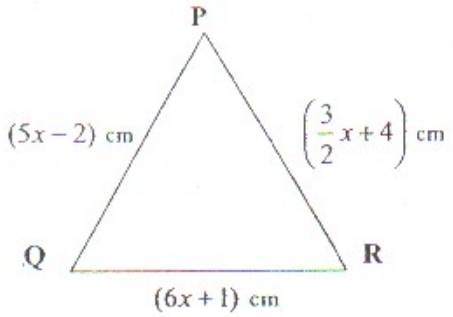
Find the values of

(a) x, [2]

(b) y and [2]

(c) z. [2]

7. PQR is a triangle in which $PQ = (5x - 2)$ cm, $QR = (6x + 1)$ cm and $PR = \left(\frac{3}{2}x + 4\right)$ cm.



(a) Given that the perimeter of triangle PQR is 53 cm, form an equation in terms of x. [1]

(b) Find the value of x. [2]

(c) Using (b), find the length of the shortest side of the triangle. [1]

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8. On a piece of blank paper, construct a quadrilateral $ABCD$ such that the base $AB = 9$ cm and $\angle BAD = 85°$, $AD = 7$ cm, $\angle ABC = 75°$ and $CD = 6.8$ cm. [2]

(a) Measure and write down the length of BC. [1]

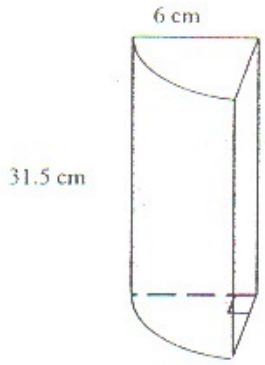
(b) On your diagram, draw:

(i) the perpendicular bisector of AB. [1]

(ii) the angle bisector of $\angle ADC$. [1]

(c) The perpendicular bisector and the angle bisector meet at X. Measure and write down the length of AX. [1]

9.



The cross sectional area of the prism shown above is a quadrant of a circle of radius 6 cm and height 31.5 cm. Taking $\pi = \frac{22}{7}$, find

(a) the area of the quadrant, [1]

(b) the volume of the prism, [1]

(c) the total surface area of the prism. [3]

10. **Answer the whole of this question on a sheet of graph paper.**

x	-3	-2	-1	0	1	2	3
y	a	-6	-4	-2	b	2	4

The given table of values is for $y = 2(x-1)$.

(a) Find the values of a and b. [2]

(b) Using a scale of 2 cm to represent 1 unit on the x-axis and 1 cm to represent 1 unit on the y-axis, draw the graph of $y = 2(x-1)$ for the values of x in the range $-3 \le x \le 3$. [2]

(c) Using your graph,

(i) find the value of x when $y = 5$. [1]

(ii) calculate the gradient of the line. [1]

11. The pie chart below shows how Hannah spends her allowance of \$240 in a particular month.

(a) Calculate:

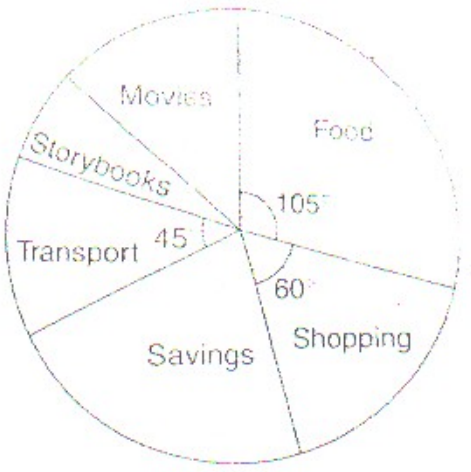
(i) the amount spent on food. [1]

(ii) the fraction of the amount spent on shopping. [1]

(iii) the percentage of the amount spent on transport. [1]

(b) If she managed to keep \$52 as savings, calculate the angle of the sector representing savings. [2]

(c) Given that she spent twice the amount on movies than on storybooks, calculate the amount she spent on movies. [3]



~ End of Paper ~

Sec 1 Express Paper 2 Solutions

1. (a)
$3 \mid 3, 5, 8$
$5 \mid 1, 5, 8$
$2 \mid 1, 1, 8$
$2 \mid 1, 1, 4$
$2 \mid 1, 1, 2$
$\mid 1, 1, 1$ [M1]

$\text{LCM} = 3 \times 5 \times 2 \times 2 \times 2$
$= 15 \times 8$
$= 120\ mins$
$= 2\ hrs$ [M1]

0600 + 2 *hrs* → 0800 hrs (8:00 am) [A1]

(b)(i)
$2 \mid 120, 192, 252$
$2 \mid 60, 96, 126$
$3 \mid 30, 48, 63$
$\mid 10, 16, 21$ [M1]

10 *cm*, 16 *cm*, 21 *cm* [A1]

(ii) $\text{HCF} = 2 \times 2 \times 3$
$= 12\ pieces$ [A1]

2. (a)
$$(xy)^2 - 8xz = (-4)^2 - 8(-1)(3)$$
$$= 16 - (-24)$$
$$= 16 + 24 \quad [M1]$$
$$= 40 \quad [A1]$$

(b)
$$\frac{xy}{z} - \frac{yz}{x} + \frac{xz}{y} = \frac{-4}{3} - \left(\frac{12}{-1}\right) + \left(\frac{-3}{4}\right)$$
$$= -\frac{4}{3} + 12 - \frac{3}{4} \quad [M1]$$
$$= 9\frac{11}{12} \quad [A1]$$

3. (a)
$$\frac{x+y}{4} - \frac{2x-y}{5}$$
$$= \frac{5(x+y) - 4(2x-y)}{20}$$

$$= \frac{5x + 5y - 8x + 4y}{20} \quad [M1]$$

$$= \frac{-3x + 9y}{20} \quad \left(\frac{9y - 3x}{20}\right) \quad [A1]$$

(b) $\frac{2(m-1)}{3} + \frac{3(2m-3)}{4}$

$$= \frac{2(4)(m-1)}{12} + \frac{3(3)(2m-3)}{12}$$

$$= \frac{2(4)(m-1) + 3(3)(2m-3)}{12}$$

$$= \frac{8(m-1) + 9(2m-3)}{12}$$

$$= \frac{8m - 8 + 18m - 27}{12} \quad [M1]$$

$$= \frac{26m - 35}{12} \quad [A1]$$

4. (a) $2x - [9 - 3(4x - 7)] = 36$

$2x - [9 - 12x + 21] = 36$

$2x - [30 - 12x] = 36$ [M1]

$2x - 30 + 12x = 36$

$14x = 66$ [M1]

$x = \frac{66}{14}$

$= \frac{33}{7}$

$= 4\frac{5}{7}$ [A1]

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

$\frac{3x - 2}{4} = x - 5$ [M1]

$3x - 2 = 4(x - 5)$

$3x - 2 = 4x - 20$

$3x - 4x = -20 + 2$ [M1]

$-x = -18$

$x = 18$ [A1]

5. (a) Average Speed = $625 \div 5$
$= 125\ km/hr$ [A1]

(b) Time Taken = $240 \div 100$ [M1]
$= 2.4\ hrs \left(2\frac{2}{5}\ hrs\right)$ [A1]

(c) Distance = $625 + 240$
$= 865\ km$

Time Taken = $5 + 2.4$
$= 7.4\ hrs$

Average Speed = $\frac{864}{7.4}$ [M1]
$= 116.89\ km/hr \left(116\frac{33}{37}\ km/hr\right)$ [A1]

6. (a) $2x + 17 = 69°$
$2x = 52°$ [M1]
$x = 26°$ [A1]

(b) $5y - 24 = 69°$
$5y = 93°$ [M1]
$y = 18.6° \left(18\frac{3}{5}°\right)$ [A1]

(c) $4z - 28 = 69°$
$4z = 97°$ [M1]
$z = 24.25° \left(24\frac{1}{4}°\right)$ [A1]

7. (a) $(5x - 2) + (\frac{3}{2}x + 4) + (6x + 1) = 53$ [A1]

(b) $5x - 2 + \frac{3}{2}x + 4 + 6x + 1 = 53$

$12\frac{1}{2}x + 3 = 53$

$12\frac{1}{2}x = 50$ [M1]

$x = 50 \div 12\frac{1}{2}$

$x = 4$ [A1]

(c) $(5x-2) = 20-2 = 18\ cm$

$(\frac{3}{2}x+4) = 6+4 = 10\ cm$

$(6x+1) = 24+1 = 25\ cm$

Length of shortest side is 10 cm [A1]

8. (a) Length of BC = 6 cm [A1]

(c) Length of AX = 4.8 cm [A1]

9. (a) Area of quadrant $= \frac{1}{2} \times \pi r^2$

$= \frac{1}{2} \times \frac{22}{7} \times 6 \times 6$ [M1]

$= 28\frac{2}{7}\ cm^2$ $(28.29\ cm^2)$ [A1]

(b) Volume of prism $= 28\frac{2}{7} \times 31.5$

$= 891\ cm^3$ [A1]

(c) Total Surface Area

$= (31.5 \times 6) + (31.5 \times 6) + 28\frac{2}{7} + 28\frac{2}{7} + \left(\frac{1}{4} \times \frac{22}{7} \times 12 \times 31.5\right)$ [M1]

$= 189 + 189 + 28\frac{2}{7} + 28\frac{2}{7} + 297$ [M1]

$= 731\frac{4}{7}\ cm^2$ $(731.57\ cm^2)$ [A1]

10. (a) $a = -12$ [A1]
$b = 0$ [A1]

(c)(i) $x = 2.65$ [A1]
(ii) $gradient = 3$ [A1]

11. (a)(i) $\frac{105}{360} \times 240$

$= \$70$ [A1]

(ii) $\frac{60}{360} = \frac{1}{6}$ [A1]

(iii) $\frac{45}{360} \times 100\%$

$= 12.5\%$ [A1]

(b) $\frac{52}{240} \times 360°$ [M1]

$= 78°$ [A1]

(c) $\angle$ representing movies and storybooks

$= 360° - 105° - 60° - 78° - 45°$

$= 72°$

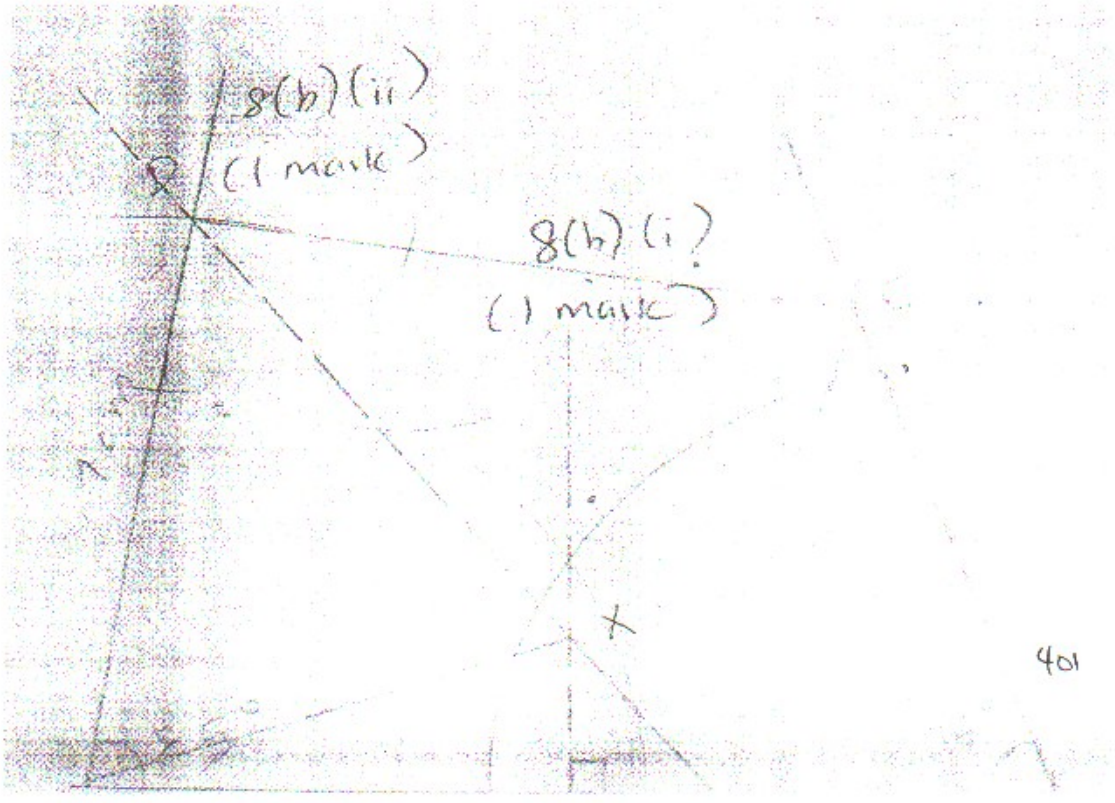
Let x be the $\angle$ representing storybooks
Let $2x$ be the $\angle$ representing movies

$2x + x = 72°$
$3x = 72°$
$x = 72° \div 3$
$x = 24°$

$2x = 2 \times 24 = 48°$

Amount spent on movies
$= \frac{48}{360} \times \$240$ [M1]
$= \$32$ [A1]

Question 8:



[1 mark:correct dimensions]
[1 mark:correct diagram]

Question 10: