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Class	Index Number	Name
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409



SINGAPORE CHINESE GIRLS' SCHOOL

Preliminary Examination 2014

Secondary Four

MATHEMATICS PAPER 1

4016/01

Thursday

31 July 2014

2 hours

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your class, index number and name 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.

Calculator 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 .

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 80.

This Question Paper consists of 15 printed pages and 1 blank page.

[Turn Over

*Mathematical Formulae**Compound Interest*

$$\text{Total amount} = P \left(1 + \frac{r}{100}\right)^n$$

Mensuration

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3} \pi r^3$$

$$\text{Area of triangle} = \frac{1}{2} ab \sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2} r^2 \theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard Deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$$

- 1 Evaluate $\frac{86.2^3}{\sqrt{2860} - 8.26}$, giving your answer correct to 1 significant figure.

Answer [2]

- 2 (a) Express $1\frac{7}{25}\%$ as a fraction in its simplest form.
 (b) Find the decimal number which is exactly half-way between -2.35 and 1.8 .

Answer (a) [1]

(b) [1]

- 3 (a) Simplify $\frac{4a^3 \times 3a^{-6}}{18a^2}$.
 (b) Solve $(4b^2 - 4b + 2)^{1-2b} = 1$.

Answer (a) [1]

(b) $b =$ [1]

- 4 The instructions for cooking a turkey in an oven are as shown below.

Step 1 : Cook the turkey for 15 minutes at 230°C .
 Step 2 : Reduce the oven temperature to 175°C . For every kilogram of turkey, cook for 40 minutes.

Mrs Ang cooked a 7 kilogram turkey.
 She wants to take it out of the oven at 18 30.
 Calculate the time Mrs Ang must put the turkey into the oven.

Answer [2]

[Turn Over]

5 y is directly proportional to the square root of x .

(a) Given that $y = \frac{1}{3}$ when $x = 49$, express y in terms of x .

(b) Describe the change in y when x is increased by 300%.

Answer (a) [1]

(b) [1]

6 The area of a field is 7.84 km^2 .

On a map, the area of the field is represented by 49 cm^2 .

Express the scale of the map as a ratio in the form $1 : n$, where n is a positive integer.

Answer 1 : [2]

7 (a) Solve the inequality $-3 \leq \frac{x-2}{3} - \frac{x}{2} < 5$.

(b) Hence find the difference between the greatest and least integer values of x which satisfy $-3 \leq \frac{x-2}{3} - \frac{x}{2} < 5$.

Answer (a) [2]

(b) [1]

- 8 One astronomical unit (AU) is approximately 150 gigametres.
 A particle travels 120 centimetres in approximately 95 microseconds.
 Find the time, in seconds, taken by the particle to travel 2 AU.
 Express your answer in standard form, giving your answer to a sensible degree of accuracy.

Answer s [2]

- 9 Solve the simultaneous equations

$$\begin{aligned} 9x + 2y &= -12, \\ 7 - 12x + 5y &= 0. \end{aligned}$$

Answer $x =$

$y =$ [3]

- 10 The results of a Mathematics test of some pupils are shown below.

Marks, x	6 – 10	11 – 15	16 – 20	21 – 25	26 – 30
Number of pupils	4	5	9	8	6

Estimate

- (a) the mean,
 (b) the standard deviation.

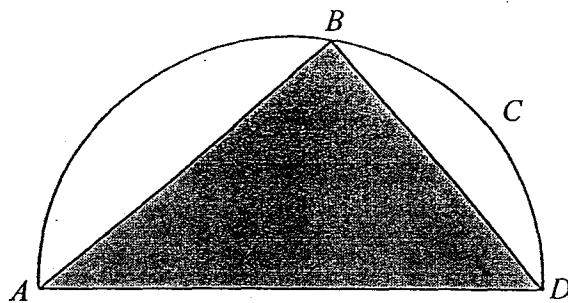
Answer (a) [1]

(b) [2]

[Turn Over]

- 11 $ABCD$ is a semicircle with AD as the diameter.
 $AB = 11.2$ cm and $AD : AB = 5 : 4$.

Using $\pi = \frac{22}{7}$, find the ratio of area of shaded region to area of unshaded region.



Answer [3]

- 12 (a) Solve the equation $m - \frac{4m-5}{2} - 6 = 0$.

(b) Factorise fully

(i) $1 - 121n^2$,

(ii) $36p - 3p^2 - 18p^3$.

Answer (a) $m =$ [1]

(b)(i) [1]

(ii) [2]

- 13 (a) The numbers 540 and 1008, written as product of their prime factors are

$$540 = 2^2 \times 3^3 \times 5 \text{ and } 1008 = 2^4 \times 3^2 \times 7.$$

Find

- (i) the largest integer that divides 540 and 1008 exactly,

- (ii) the smallest integer, k , such that $\sqrt[3]{\frac{1008}{k}}$ is a positive integer.

- (b) Find the least number that must be added to 2203 such that the sum is exactly divisible by 2, 3, 4, 5 and 6.

Answer (a)(i) [1]

(ii) [1]

(b) [2]

- 14 A brand of cereal is sold in rectangular boxes with dimensions 15 cm by 6 cm by 22 cm.

- (a) In a promotion, the company repackaged the boxes and is offering "30% extra free". Calculate the new volume of each rectangular box.

- (b) Each box of cereal has a mass of 500 g correct to the nearest 10 g.

A container holds exactly 12 of these boxes of cereal.

The empty container has a mass of 1.5 kg correct to the nearest 0.1 kg.

Calculate the least possible total mass, in kilograms, of the container and 12 boxes of cereal.

Answer (a)cm³ [2]

(b)kg [2]

[Turn Over

- 15 A concert performance was held on Friday, Saturday and Sunday.
The table below shows the number of adults and children attending on each day.

	Friday	Saturday	Sunday
Number of adults	160	220	285
Number of children	45	130	150

The information for the number of people attending the performance can be represented by

$$P = \begin{pmatrix} 160 & 220 & 285 \\ 45 & 130 & 150 \end{pmatrix}.$$

- (a) (i) Given that $R = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$, evaluate $S = PR$.

(ii) Describe what is represented by the elements of S .

- (b) The entry price per day for an adult and for a child is \$52 and \$27 respectively.
Using matrix multiplication, find the total amount of money collected from the 3 days of performances.

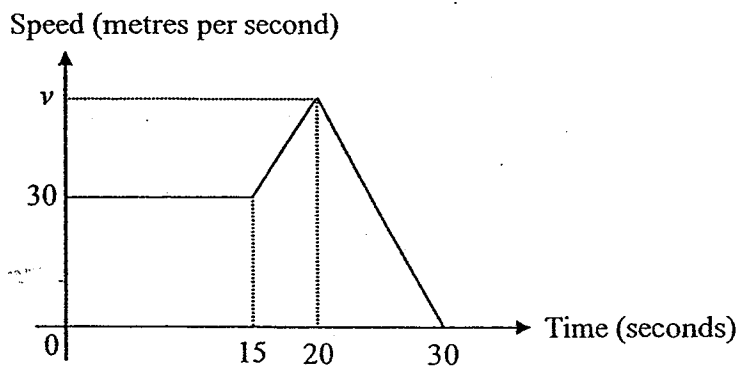
Answer (a)(i) [1]

Answer (a)(ii)

.....
.....
..... [1]

Answer (b) \$ [2]

16 The diagram shows the speed-time graph of a particle.



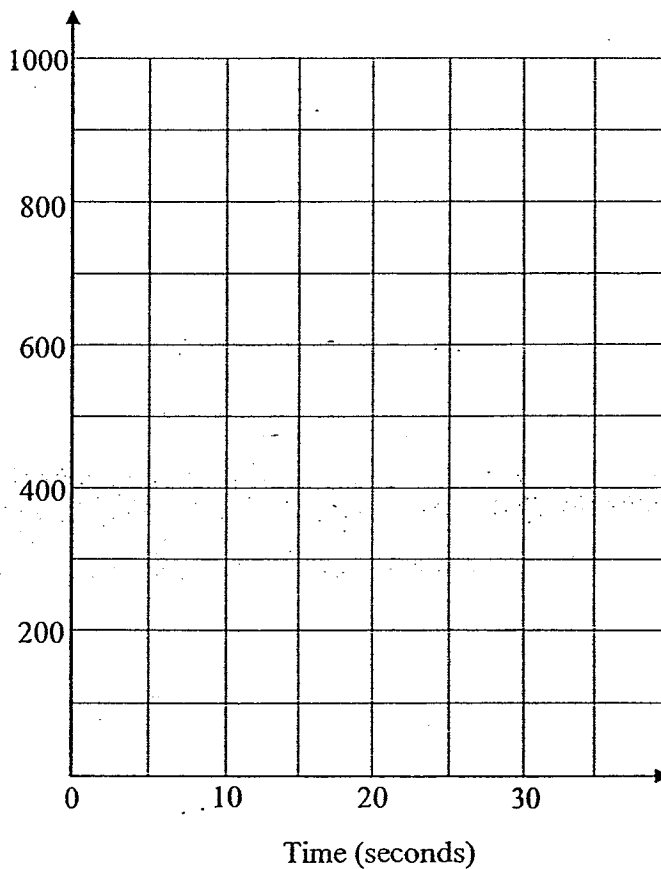
- (a) Given that the deceleration of the particle is 5 m/s^2 , calculate the maximum speed, v .

Answer (a) $v = \dots\dots\dots$ [1]

- (b) On the grid in the answer space, sketch the distance-time graph of the particle for the same journey.

Answer (b) Distance (metres)

[2]



[Turn Over]

17 A list of the ages of 10 customers who shopped in a grocery store one day is shown below.

5, 8, 32, 41, 8, 7, 4, 18, 54, 71

(a) Find

- (i) the modal,
- (ii) the median,
- (iii) the mean age.

(b) From the data,

- (i) explain why the mode is not a good measure of average,
- (ii) justify whether the median or the mean is the best measure of average.

Answer (a)(i) [1]

(ii) [1]

(iii) [1]

Answer (b)(i)

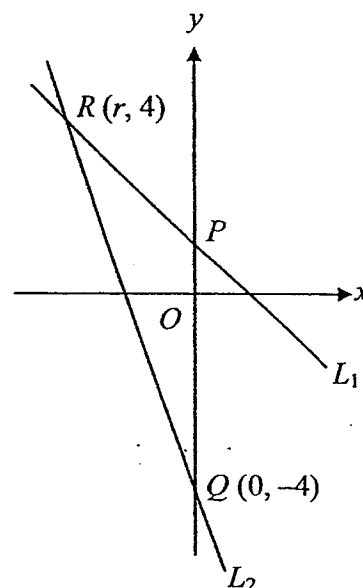
..... [1]

(ii)

..... [1]

- 18 The line L_1 , with equation $3x + 4y - 4 = 0$, cuts the y -axis at P .
 The line L_2 cuts the y -axis at $Q(0, -4)$.
 Lines L_1 and L_2 intersect at the point $R(r, 4)$.

- (a) State the equation of the line passing through Q and is parallel to the x -axis.
 (b) Find the equation of the line L_2 .
 (c) Express, as a fraction in its simplest form, the value of
 (i) $\tan \hat{RQP}$,
 (ii) $\cos \hat{RPQ}$.
 (d) A trapezium $PQRS$, with PQ parallel to SR , has an area of 16 units^2 .
 Find the coordinates of S .



Answer (a) [1]

(b) [2]

(c)(i) $\tan \hat{RQP} =$ [1]

(ii) $\cos \hat{RPQ} =$ [1]

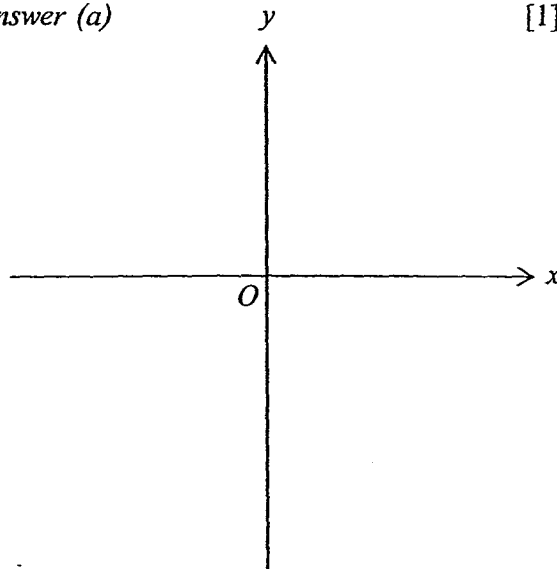
(d) (.....,) [1]

[Turn Over

- 19 (a) The equation of a straight line is $ax + y = b$, where $a < 0$ and $b < 0$. Sketch a possible straight line graph in the answer space.

Answer (a)

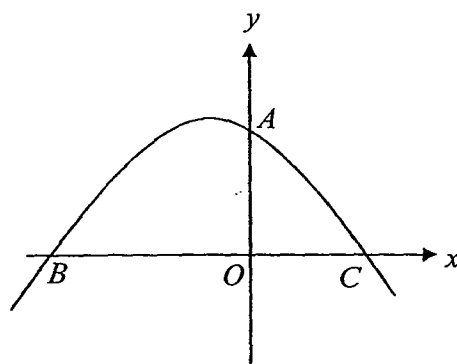
[1]



- (b) The diagram shows a quadratic graph which cuts the y -axis at $A (0, 9)$ and the x -axis at B and $C (2, 0)$.

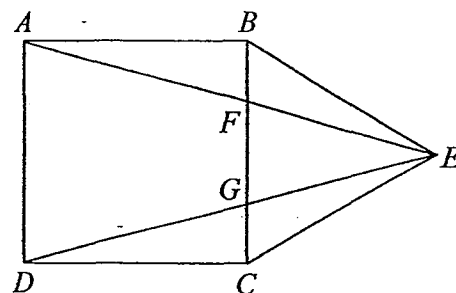
The greatest value of y occurs when $x = -\frac{1}{2}$.

Write down the equation of this graph in the form $y = ax^2 + bx + c$.



Answer (b) [2]

- (d) Find angle AED .



Answer (a)

[3]

(b)

[2]

(c)

. [1]

Answer (d)^o [1]

[Turn Over

- 21 Annie buys a packet of 18 identical hyacinth bulbs.
One third of the bulbs will produce pink flowers, 4 of the bulbs will produce blue flowers and the remainder will produce purple flowers.
- (a) Find the probability that a bulb taken will not produce a blue flower.
- (b) 2 bulbs are taken at random and planted.
Calculate the probability that
- (i) one bulb will produce a pink flower and the other will produce a purple flower,
 - (ii) at least one blue flower will be produced.
- (c) 3 bulbs are taken at random and planted.
Calculate the probability that all the 3 bulbs will produce purple flowers.

Answer (a) [1]

(b)(i) [2]

(ii) [2]

(c) [2]

22 A map is drawn to a scale of 2 cm to 5 km.

The diagram below shows the positions of two towns A and B on the map.

- (a) A third town, C is at a bearing of 010° from town A and at a bearing of 290° from town B .

Construct and label the position of town C .

[1]

- (b) A hospital is to be built equidistant from AB and BC and 8 km from AB .

Using compasses and ruler, construct and label H , for the position of the hospital.

[2]

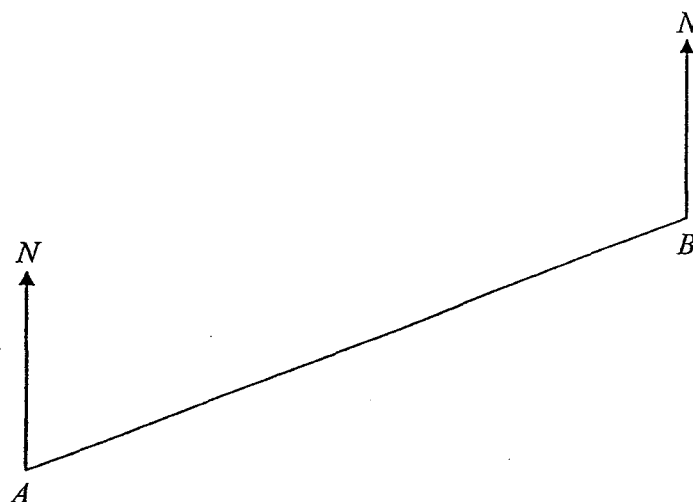
- (c) A supermarket is to be built equidistant from A and B and 15.5 km from A .

Using compasses and ruler, construct and label S_1 and S_2 , the two possible positions of the supermarket.

[3]

- (d) A petrol station, P , which is inside the triangle ABC , is equidistant from A and B , and is nearer to AB than BC . Mark and label clearly a possible position of the petrol station, P .

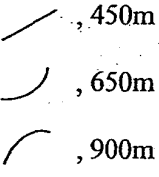
[1]

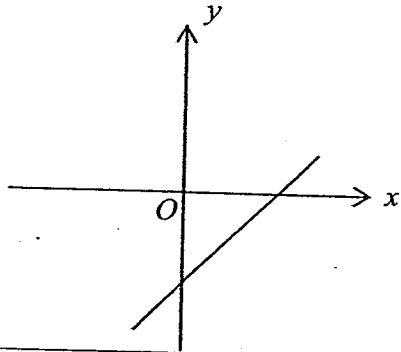


[Turn Over]

Secondary 4 Elementary Mathematics
Preliminary Examination 2014
Paper 1 Answers

391

1	10000
2(a)	$\frac{8}{625}$
(b)	-0.275
3(a)	$\frac{2}{3a^5}$
(b)	$\frac{1}{2}$
4	13 35
5 (a)	$y = \frac{\sqrt{x}}{21}$
(b)	y is increased by 100%
6	1 : 40 000
7 (a)	$-34 < x \leq 14$
(b)	47
8	2.4×10^7 s
9	$x = -\frac{2}{3}, y = -3$
10 (a)	19.1
(b)	6.34
11	168 : 107
12(a)	-3.5
(b)(i)	$(1 + 11n)(1 - 11n)$
(ii)	$3p(4 - 3p)(3 + 2p)$
13(a)(i)	36
(ii)	126
(b)	17
14(a)	2574 cm^3
(b)	7.39 kg
15(a)(i)	$\begin{pmatrix} 665 \\ 325 \end{pmatrix}$
(ii)	It represents the total number of adults and children respectively who attended the performance over the 3 days.
(b)	\$43 355
16 (a)	50
(b)	  , 450m  , 650m  , 900m
17(a)(i)	8
(ii)	13
(iii)	24.8
(b)(i)	The highest frequency of the ages might not be at the centre.
(ii)	Mean is the best measure of average as it takes into account all of the values.

18(a)	$y = -4$
(b)	$y = -2x - 4$
(c)(i)	$\frac{1}{2}$
(ii)	$-\frac{3}{5}$
(d)	$(-4, 7)$
19(a)	
19(b)	$y = -\frac{3}{2}x^2 - \frac{3}{2}x + 9$
20(a)	$\triangle ABE$ is congruent to $\triangle DCE$ (SAS)
(b)	$\triangle ADE$ is similar to $\triangle FGE$
(c)	exterior angles of cyclic quadrilateral
(d)	30°
21(a)	$\frac{7}{9}$
(b)(i)	$\frac{16}{51}$
(ii)	$\frac{62}{153}$
(c)	$\frac{7}{102}$



SINGAPORE CHINESE GIRLS' SCHOOL

Preliminary Examination 2014

Secondary Four

MATHEMATICS PAPER 2

4016/02

Tuesday

5 August 2014

2 hours 30 minutes

Additional materials: Answer Paper
Graph paper (1 sheet)

READ THESE INSTRUCTIONS FIRST

Write your index number, class and name 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, 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 number of marks for this paper is 100.

The Question Paper consists of 11 printed pages and 1 blank page.

[Turn Over

*Mathematical Formulae**Compound Interest*

$$\text{Total amount} = P \left(1 + \frac{r}{100} \right)^n$$

Mensuration

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3} \pi r^3$$

$$\text{Area of triangle } ABC = \frac{1}{2} ab \sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2} r^2 \theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f} \right)^2}$$

Answer all the questions.

- 1 (a) The universal set $\mathcal{E}$ and its subsets A and B are given by

$$\mathcal{E} = \{x : x \text{ is an integer, } 2 < x \leq k\},$$

$$A = \{x : -\frac{1}{2} < \frac{x}{4} - 1 < \frac{3}{2}\},$$

$$B = \{x : x \text{ is a factor of } 18\}.$$

If $n(\mathcal{E}) = 17$,

- (i) state the value of k , [1]
- (ii) draw a Venn Diagram to illustrate the above information, [2]
- (iii) write down the value of $n(A' \cap B')$. [1]
- (iv) Given that $C = \{x : x \text{ is an integer divisible by } 11\}$,
describe the set $B \cap C$, as simply as possible, in words. [1]

- (b) The first five terms in a sequence of numbers, $T_1, T_2, T_3, T_4, T_5, \dots$ are given below.

T_1	=	7	+	3	=	10
T_2	=	2	+	12	=	14
T_3	=	-3	+	27	=	24
T_4	=	-8	+	48	=	40
T_5	=	p	+	q	=	r
$\vdots$		$\vdots$		$\vdots$		$\vdots$

- (i) Find the values of p , q and r . [2]
- (ii) Find an expression, in terms of n , for the n^{th} term, T_n , of the sequence. [2]

- 2 (a) Given that $p^2 + \frac{1}{p^2} = 6$, find the values of $\frac{1}{5}\left(\frac{1}{p} - p\right)$. [2]
- (b) Given that $r^2 p - p^2 = (r^2 - q)q$, express, in its simplest form, r in terms of p and q . [3]
- (c) Express $\frac{xy - 2x^2}{wy + 6xz - 2xw - 3yz} - \frac{3}{6z - 2w}$ as a single fraction. [3]
-

- 3 Nancy drove 28 km to her office at an average speed of x km/h.

On her way home, due to heavy traffic jam, her average speed was reduced by 26 km/h.

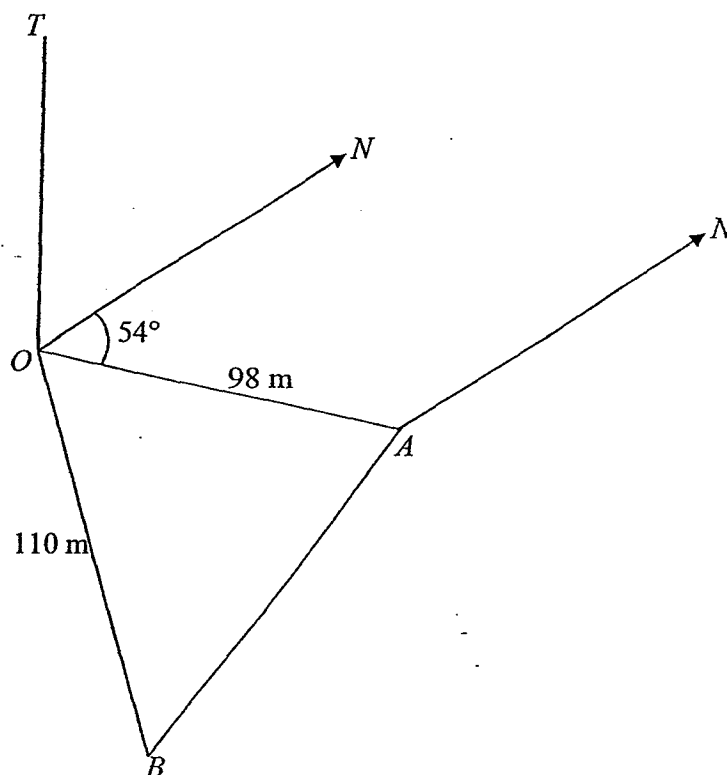
- (a) Write down an expression, in terms of x , the time taken in hours, for her journey from home to office. [1]
- (b) Write down an expression, in terms of x , the time taken in hours for her journey from office to home. [1]
- (c) Nancy took 20 minutes more to travel from office to home than from home to office.
- (i) Form an equation in x to represent this information and shows that it reduces to
- $$x^2 - 26x - 2184 = 0. \quad [3]$$
- (ii) Solve the equation $x^2 - 26x - 2184 = 0$, giving your answers correct to 2 decimal places. [3]
- (iii) Calculate the total time taken by Nancy from home to office and from office to home. Express your answer in minutes and seconds (correct to the nearest seconds). [1]
-

- 4 (a) Serene and Trina each bought a car priced at S\$120 000 in Singapore.

- (i) Serene made a downpayment of 70% of the car price. She then paid a monthly instalment of \$833 for 5 years at $x\%$ simple interest per annum. Find the value of x . [3]
- (ii) Trina paid 50% of the car price as downpayment. She paid the balance at a rate of 5% per annum compounded monthly for 5 years. Calculate the monthly instalment paid by Trina, giving your answer to the nearest dollars. [2]

- (b) One day, the exchange rate between Australia dollars (A\$) and Singapore dollars (S\$) was S\$1 = A\$0.8561. Vicky bought a similar car in Australia and she paid A\$ 86 000. Calculate the additional amount paid by Serene as a percentage of the amount paid by Vicky. [3]

- 5 In the diagram, three points O , A and B are on level ground. A and B are on a bearing of 054° and 125° respectively from O . $OA = 98$ m and $OB = 110$ m. T is the top of a flagpole standing vertically at O .

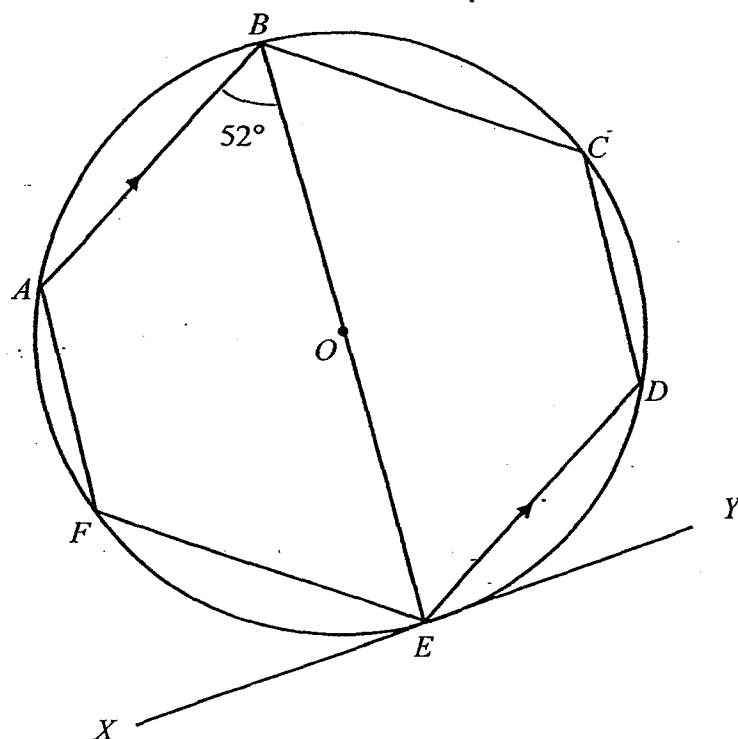


(a) Calculate

- (i) the distance AB , [3]
- (ii) the bearing of B from A . [3]

- (b) A man walks along AB . Given that the greatest angle of elevation of the top of the flagpole when viewed by the man is 12° , find the height of the flagpole. [3]

- 6 In the diagram, A, B, C, D, E and F are points on the circumference of a circle. XY is a tangent to the circle at point E and AB is parallel to ED . The centre, O , is on the line BE .



- (a) Given that angle $ABE = 52^\circ$, calculate, stating your reasons clearly,

(i) angle BCD , [2]

(ii) angle BDO . [2]

- (b) Show that triangles AED and BDE are similar. [2]

- (c) Given that AF is parallel to BE , calculate angle FEX . [2]

- 7 The variables x and y are connected by the equation

$$y = x + \frac{4}{x} - 10.$$

Some corresponding values of x and y , correct to 2 decimal places where appropriate, are given in the table below.

x	0.25	0.5	1	1.5	2	3	4	6	8
y	6.25	-1.5	-5	-5.83	-6	k	-5	-3.33	-1.5

- (a) Find the value of k . [1]

- (b) Using a scale of 2 cm to represent 1 unit, draw a horizontal x -axis for $0 < x \leq 8$.

Using a scale of 1 cm to represent 1 unit, draw a vertical y -axis for $-8 \leq y \leq 8$.

- On the axes, plot the points given in the table and join them with a smooth curve. [3]

- (c) By drawing a tangent to the given curve, find the gradient of the curve at the point $(1, -5)$. [2]

- (d) Use the graph to find the values of x in the range $0 < x \leq 8$ for which

$$2x^2 - 11x + 8 = 0. \quad [2]$$

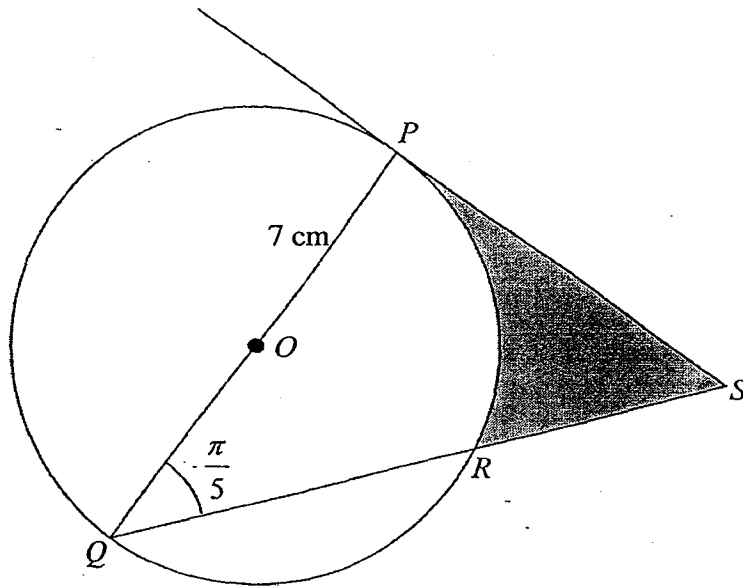
- (e) On the same axes, draw the graph of $y = -x + 4$ for values of x in the range of $0 \leq x \leq 8$. [1]

- (i) Write down the x -coordinates of the points at which the two graphs intersect. [1]

- (ii) The equation $ax^2 + bx + c = 0$ is satisfied by the value of x found in part (e) (i).

Find the values of a , b and c . [2]

- 8 In the diagram, the circle, centre O , of radius 7 cm, passes through points P , Q and R and angle $PQR = \frac{\pi}{5}$ radians. The tangent at P meets QR produced at S .



- (a) Show that $RS = 5.978$ cm, correct to 4 significant figures.

[3]

- (b) Calculate

- (i) the perimeter,

[4]

- (ii) the area of the shaded region.

[4]

- 9 Diagram I shows a right pyramid container with a rectangular base $ABCD$ and vertex V , partially filled with water. $EFGH$ is the horizontal surface of the water in the container.

$AB = 60$ cm, $AD = 80$ cm, $EH = 40$ cm and the volume of the pyramid is 81 litres.

- (a) Show that the volume of water in the pyramid container is 24 000 cubic centimetres. [2]
- (b) All the water in the pyramid container are transferred into another empty container made by joining a hollow cylinder of radius 20 cm to an upright open cone of radius 20 cm and height 45 cm as shown in Diagram II.

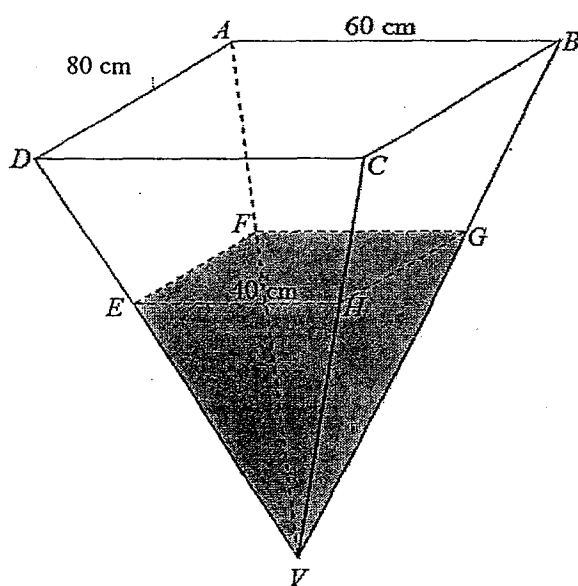


Diagram I

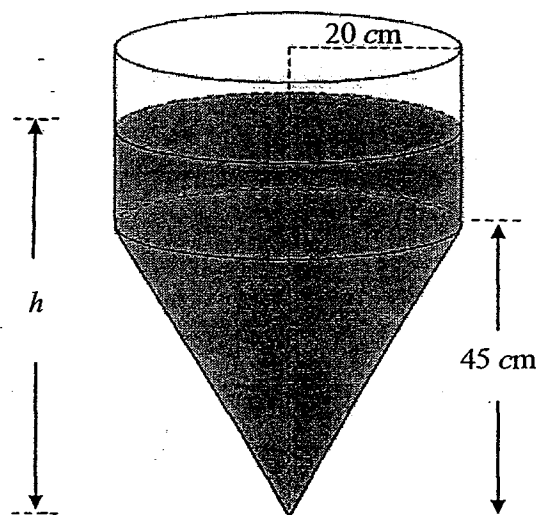
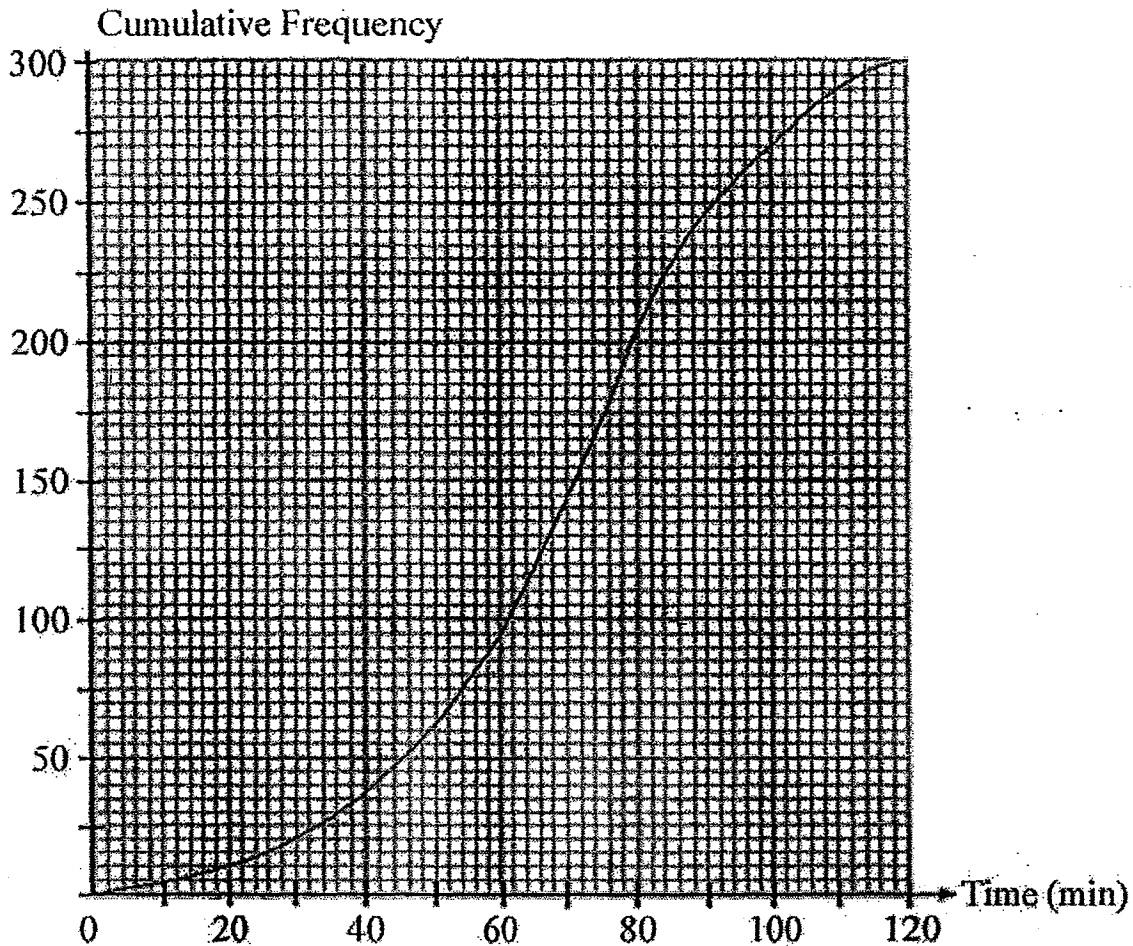


Diagram II

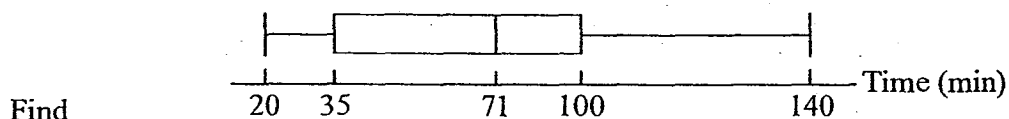
For the container shown in Diagram II, find

- (i) h , the depth of the water level, in centimetres, [3]
- (ii) the surface area, that is in contact with the water. [3]

- 10 The cumulative frequency graph shows the time (in minutes) spent by 300 male senior citizens at the Community Club per visit.



- (a) Use the graph to estimate
- the median time, [1]
 - the interquartile range, [1]
 - the value of T if 60% of the senior citizen spent more than T min at the Community Club per visit. [1]
- (b) Two senior citizens are chosen at random. Expressing your answer as a fraction, calculate the probability that one Senior Citizens spent less than or equal to 30 minutes and the other senior citizen spent more than 90 minutes at the Community Club per visit. [2]
- (c) The box-and-whisker plot shows the time (in minutes) spent by 300 female senior citizens at the Community Club per visit.



- (i) the median, [1]
- (ii) the interquartile range. [1]
- (d) Compare briefly the time spent by the male and the female senior citizens at the community Club per visit. [2]

- 11 (a) It is given that B is the point $(-8, 2)$ and $\vec{AB} = \begin{pmatrix} -20 \\ 7 \end{pmatrix}$.

Find

- (i) $|\vec{AB}|$, [1]
 (ii) the position vector of A . [1]

- (b) In the diagram, $\vec{OP} = 3\mathbf{p}$, $\vec{PR} = 4\mathbf{q}$ and $\vec{OQ} = 8\mathbf{q}$. S is a point on PQ such that $2\vec{PS} = 3\vec{SQ}$.

- (i) Express the following, as simply as possible, in terms of $\mathbf{p}$ and/or $\mathbf{q}$,

(a) $\vec{PQ}$,

(b) $\vec{OS}$,

(c) $\vec{SR}$. [3]

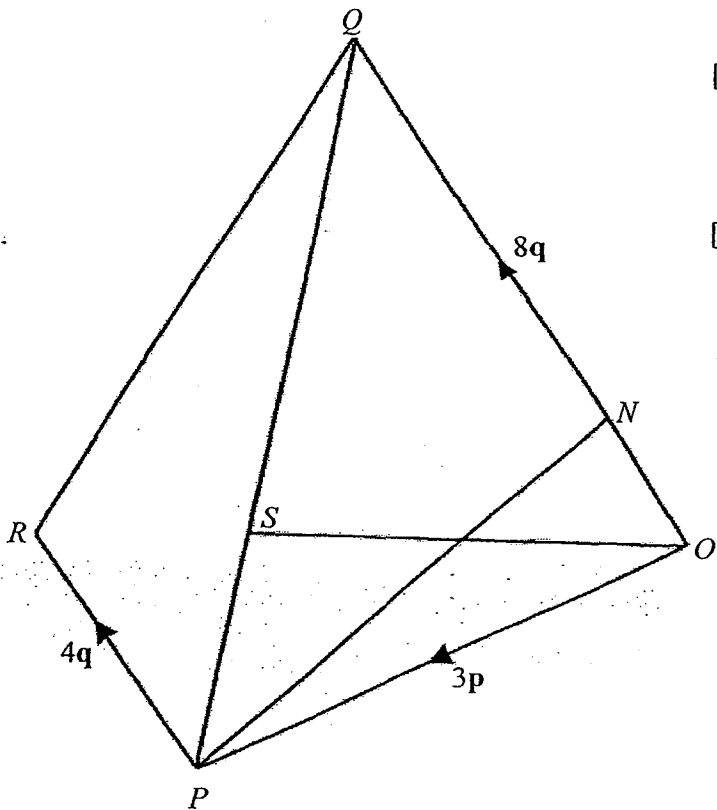
- (ii) State two facts about the points O , S and R . [2]

- (iii) Given that N is a point on OQ such that $4\vec{ON} = \vec{OQ}$.

Find as a fraction, the value of

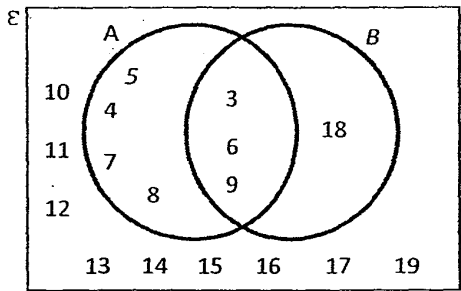
(a) $\frac{\text{area of triangle } OPN}{\text{area of triangle } NPQ}$, [1]

(b) $\frac{\text{area of triangle } OPN}{\text{area of quadrilateral } OPRQ}$. [1]



~ End of Paper ~

2014 SCGS Math Prelim P2 answer Keys

Qn	Answers
1(a) i	$k = 19$
1(a) ii	
1(a) iii	$n(A \cap B) = 9$
1(b)	Empty set
1(c) i	$P = -13, q = 75, r = 62$
1(c) ii	$T_n = (12 - 5n) + 3n^2$ $T_n = 3n^2 - 5n + 12$
2(a)	$\pm \frac{2}{5}$
2(b)	$r = \pm \sqrt{p+q}$
2(c)	$\frac{3+2x}{2(w-3z)}$
3(a)	$\frac{28}{x} h$
3(b)	$\frac{28}{x-26} h$

3(c)(i)	$\frac{28}{x-26} - \frac{28}{x} = \frac{20}{60}$ $x^2 - 26x - 2184 = 0$
3(c)(ii)	$x = 61.51$ or $x = -35.51$ (2 d. pl)
3(c)(iii)	74 min 38 sec
4(a)i	$x = 7.77$
4(a)ii	S\$1283
4(b)	33.4%
5(a)i	$AB = 121$ m
5(a)ii	174.9°
5(b)	The height of the flagpole is 17.9 m.
6(a)i	$\hat{BCD} = 128^\circ$
6(a)ii	$\hat{BDO} = 38^\circ$
6(b)	triangle AED and BDE are similar.
6(c)	$\hat{FEX} = 38^\circ$
7(a)	$k = -5.67$
(b)	

(d)	gradient $= -3 \pm 0.5$
(d)	Draw $y = -4.5$ $x = 0.86$ or 4.62 ± 0.1
(e) i	Draw $y = -x + 4$ x - coordinate $= 0.3 \pm 0.1$
(e) ii	$a = 1, b = -7, c = 2$
8(a)	$RS = 5.978 \text{ m}$
8(b) i	Perimeter of the shaded area $= 24.9 \text{ cm}$
8(b) ii	Area of shaded region $= 17.1 \text{ cm}^2$
9(a)	24000 cm^3
9(b) i	$h = 49.1 \text{ cm}$
9(b) ii	Area in contact with water $= 3610 \text{ cm}^2$ (3 s.f.)
10 (a) i	Median time $= 71 \text{ min}$
10 (a) ii	Interquartile rang $= 84 - 54 = 30 \text{ min}$
10 (a) iii	$T = 66 \text{ min}$
10 (b)	$\frac{22}{897}$
10 (c) i	Median $= 71 \text{ min}$
10 (c) ii	Interquartile range $= 100 - 35 = 65 \text{ min}$
10 (d)	Both the Male and Female senior citizens spent <u>about the same duration</u> at the Community Club as the <u>median times are equal</u> . However, the higher interquartile range indicates that there is a <u>wider spread in the time spent by the female citizen</u> at the community centre.

11(a) (i)	21.2 units
11(a)ii	$\overrightarrow{OA} = \begin{pmatrix} 12 \\ -5 \end{pmatrix}$
11(b)(i)	(a) $\overrightarrow{PQ} = 8\mathbf{q} - 3\mathbf{p}$ (b) $\overrightarrow{OS} = 2\mathbf{p} + \frac{8}{3}\mathbf{q}$ (c) $\overrightarrow{SR} = \mathbf{p} + \frac{4}{3}\mathbf{q}$
11(b)(ii)	1. Since $\overrightarrow{OS} = 2\overrightarrow{SR}$, points O, S and R are collinear. 2. $\overrightarrow{OS} = 2 \overrightarrow{SR}$
11(b) iii (a)	$\frac{\text{Area of } OPN}{\text{Area of } NPQ} = \frac{1}{3}$
11(b) iii (b)	$\frac{\text{Area of } OPN}{\text{Area of } OPRQ} = \frac{1}{6}$