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XINMIN SECONDARY SCHOOL

新民中学

SEKOLAH MENENGAH XINMIN

Mid-Year Examination 2017

CANDIDATE NAME

CLASS

INDEX NUMBER

MATHEMATICS

4048/1

Paper 1

9 May 2017

Secondary 4 Express / 5 Normal (Academic)

2 hours

Setter : Ms Pang Hui Chin

Vetter : Mrs Vivien Tay

Moderator: Mrs Sabrina Phang

Additional Materials: Nil

READ THESE INSTRUCTIONS FIRST

Write your name, 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 an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, 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.

The use of an approved scientific calculator is expected, where appropriate.

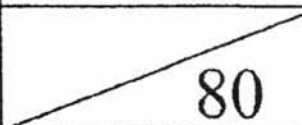
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

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 number of marks for this paper is 80.

Errors	Qn No.	Errors	Qn No.
Accuracy		Simplification	
Brackets		Units	
Geometry		Marks Awarded	
Presentation		Marks Penallised	

For Examiner's Use
 80
Parent's/Guardian's Signature:

*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) Factorise completely $3ac - 7c - 18ab + 42b$.

Answer (a) [1]

- (b) If $9x^2 + 30x + k$ is a perfect square, state the value of k .

Answer (b) $k =$ [1]

- 2 Solve the inequality $-2 \leq 2x - 7 < 19$.

er [2]

[Turn over

- 3 Evaluate, giving your answer in standard form,

(a) $\frac{17.31 + 13.13}{4.041 \times \sqrt{898.9}},$

Answer (a) [1]

(b) $2(7.8 \times 10^{-1}) + (3.9 \times 10^2).$

Answer (b) [1]

- 4 Given that x is an integer such that $-4 \leq x \leq 3$ and y is a prime number such that $0 < y \leq 7$, find

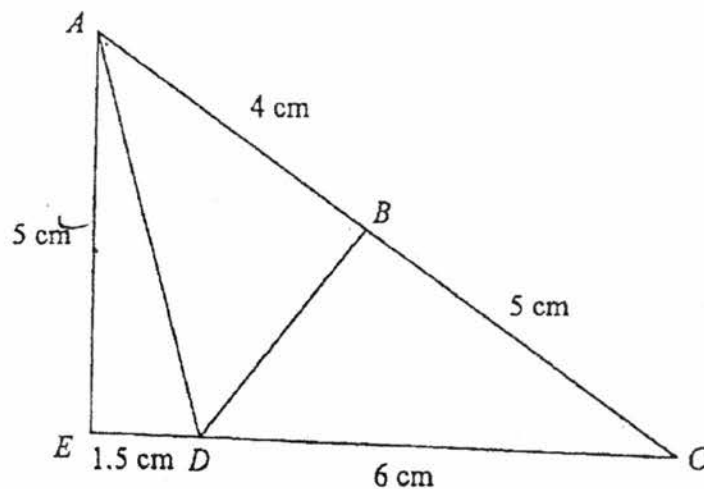
(a) the largest possible value of $\frac{x^2}{y},$

Answer (a) [1]

(b) the least possible value of $x^2 - y^2.$

Answer (b) [1]

- 5 In the diagram, $AB = 4$ cm, $BC = 5$ cm, $CD = 6$ cm, $DE = 1.5$ cm and $AE = 5$ cm.



Show that triangles ACE and DCB are similar.

Answer In triangles ACE and DCB ,

.....

.....

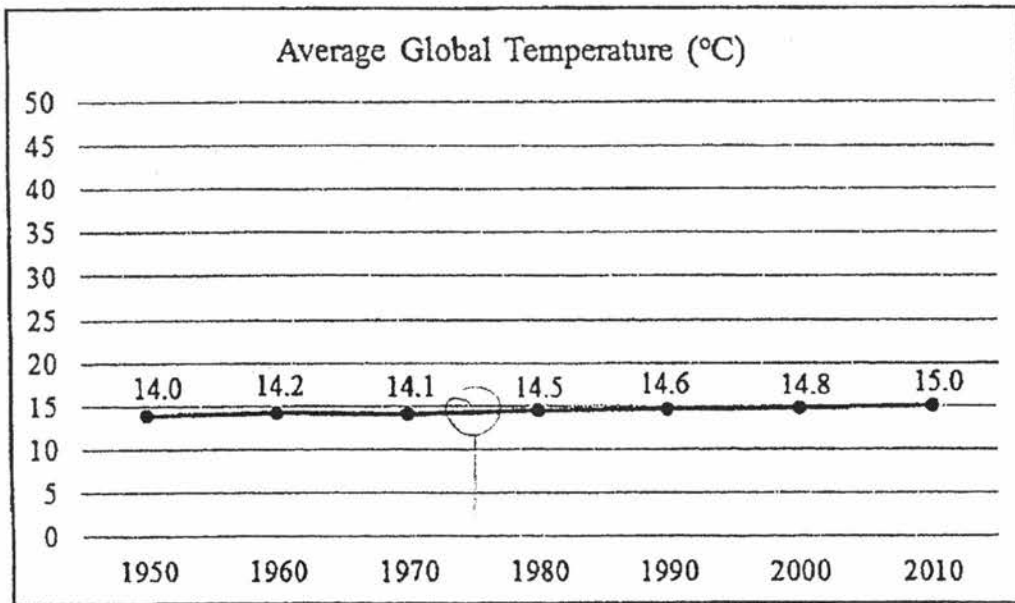
..... [2]

- 6 Given that $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$, express v in terms of u and f .

..... [2]

[Turn over]

- 7 An article in a newspaper reported the trend in the average global temperature from 1950 to 2010. The article contained the line graph shown below.



Can we determine the average global temperature in 1975 from the line graph?
Explain your answer.

Answer .

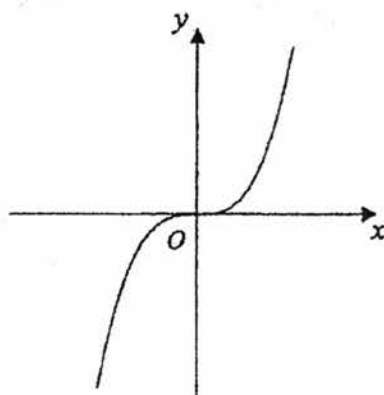
[2]

8 Solve $8^{3x-1} = 16$.

Answer $x = \dots\dots\dots$ [2]

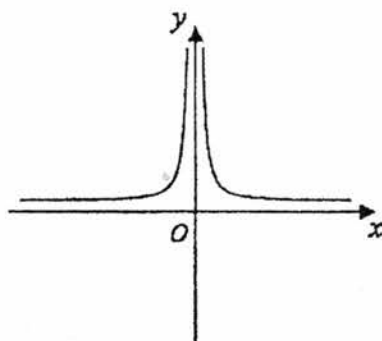
- 9 The equations of the 2 graphs are in the form $y = x^n$.
For each of the following, state a possible value of n .

(a)



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

(b)



Answer (b) $n = \dots\dots\dots$ [1]

[Turn over]

- 10 Written as the product of its prime factors,

$$2160 = 2^4 \times 3^3 \times 5,$$

$$252 = 2^2 \times 3^2 \times 7.$$

- (a) Find the smallest positive integer k such that $\frac{2160}{k}$ is a perfect cube.

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

- (b) Write down the HCF of 252 and 2160 in index notation.

Answer (b) $\dots\dots\dots$ [1]

- 11 The scale of a map is 2 cm : 0.4 km.

- (a) Write this scale in the form 1 : n .

Answer (a) $\dots\dots\dots : \dots\dots\dots$ [1]

- (b) The actual area of a park is 4 km². Find the area, in square centimetres, of the park on the map.

$\dots\dots\dots$ cm² [2]

- 12 Solve the following simultaneous equations.

$$3x - 4y = 25$$

$$4x - 5y = 32$$

Answer $x = \dots\dots\dots$

$y = \dots\dots\dots$ [3]

- 13 In Singapore, Charlie pays \$1.45 for 500 ml of bottled water.
When Charlie visited Japan, he paid ¥220 for 32 ounces of bottled water.

1 Singapore dollars = 77.96 Japanese Yen (¥)

1 ounce = 29.57 ml

Is bottled water cheaper in Singapore or in Japan?
You must show your calculations.

..... [3]

[Turn over

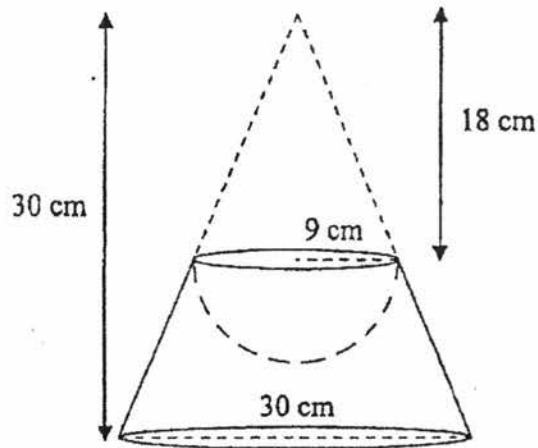
14 Simplify $\frac{1}{3-x} + \frac{3-x}{x^2-9}$.

Answer [3]

15 Simplify $\left(\frac{25x^2y^0}{3x^0y^7}\right)^0 \times \left(\frac{3a}{2}\right)^{-3}$.

..... [3]

- 16 The diagram below shows a solid pet feeding bowl made from a truncated right circular cone with a hemispherical depression.



The truncated right circular cone is made by removing a cone with base radius 9 cm and vertical height of 18 cm from a larger solid cone with a base diameter of 30 cm and a vertical height of 30 cm. The hemispherical depression has a radius of 9 cm.

The feeding bowl is to be made out of metal.

Calculate the volume of metal needed to make 10 of such feeding bowls, leaving your answer to the nearest whole number.

..... cm³ [4]

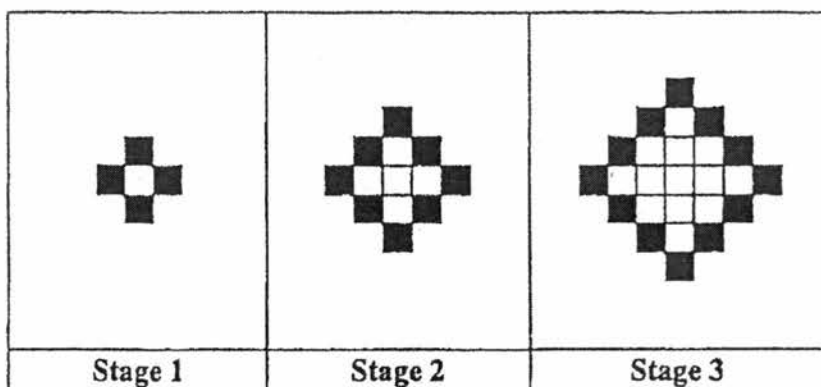
17 Given that P is inversely proportional to $\frac{12}{Q^2 + 1}$ and that $P = 13$ when $Q = 1$,
(a) express P in terms of Q ,

Answer (a) [2]

(b) find the values of Q when $P = 1$.

b) $Q = \dots\dots\dots$ or $\dots\dots\dots$ [2]

- 18 The diagram below shows a sequence of patterns made of squares of sides 1 unit each.



- (a) Study the pattern and find the values of x and y .

Stage, n	Shaded area, S	Perimeter, P
1	4	12
2	8	20
3	12	28
4	x	y

Answer (a) $x = \dots\dots\dots$

$y = \dots\dots\dots$ [2]

- (b) Express P in terms of n .

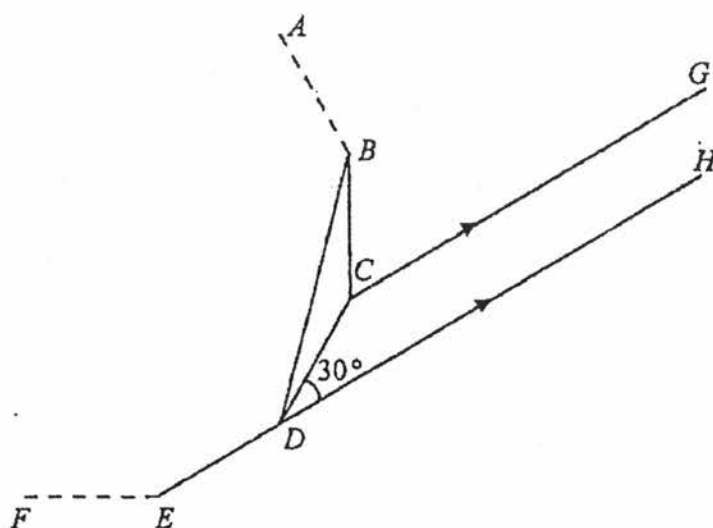
Answer (b) $\dots\dots\dots$ [1]

- (c) Determine if the number 166 would appear in the P column, stating your reasons clearly.

Answer (c) $\dots\dots\dots$

$\dots\dots\dots$

$\dots\dots\dots$ [1]



In the diagram, $ABCDEF$ is an n -sided regular polygon with exterior angle $CDH = 30^\circ$.
The lines CG and DH are parallel to each other.

Find

- (a) the value of n ,

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

- (b) obtuse $\angle DCG$,

Answer (b) $\angle DCG = \dots\dots\dots^\circ$ [1]

- (c) $\angle CBD$.

$\angle CBD = \dots\dots\dots^\circ$ [2]

20 $\xi = \{x : x \text{ is an integer such that } 40 \leq x \leq 50\}$

$A = \{x : x \text{ is a multiple of } 3\}$

$B = \{x : 2x + 5 < 99\}$

(a) Draw a Venn diagram to illustrate this information.

Answer (a)

[2]

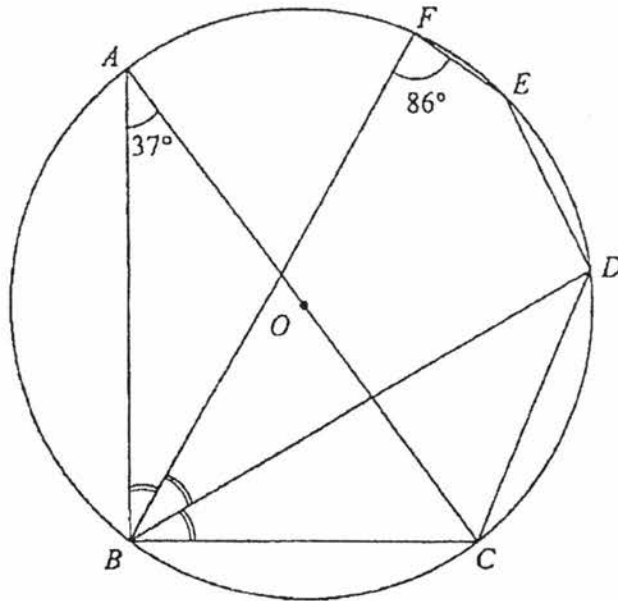
(b) List the elements of $A' \cap B'$ in set notation.

Answer (b) [1]

(c) On your Venn diagram, shade the region which represents $A \cup B'$. [1]



- 21 In the diagram, A, B, C, D, E and F lie on a circle with centre O . AC is the diameter of the circle. $\angle ABF = \angle DBF = \angle CBD$.



If $\angle BAC = 37^\circ$ and $\angle BFE = 86^\circ$, find, giving reasons for each answer,

- (a) $\angle ACB$,

Answer (a) $\angle ACB = \dots\dots\dots^\circ$ [2]

- (b) $\angle DCA$,

Answer (b) $\angle DCA = \dots\dots\dots^\circ$ [1]

- (c) $\angle FED$.

$\angle FED = \dots\dots\dots^\circ$ [1]

- 22 The staff of a company were asked about their monthly salary. The results are shown in the stem-and-leaf diagram.

1	010	050		
2	055	055	980	985
3	010	010	050	050
4	485	800	800	800
5	600	800	800	
6	750	750		
7				
8				
9				
10	999			

Key 3 | 010 means \$3010

- (a) Find the mean salary of the staff.

Answer (a) \$ [1]

- (b) Find the median salary of the staff.

Answer (b) \$ [1]

- (c) Does the mean or the median give a better representation of the salary of the staff in the company? Explain your answer.

Answer (c)

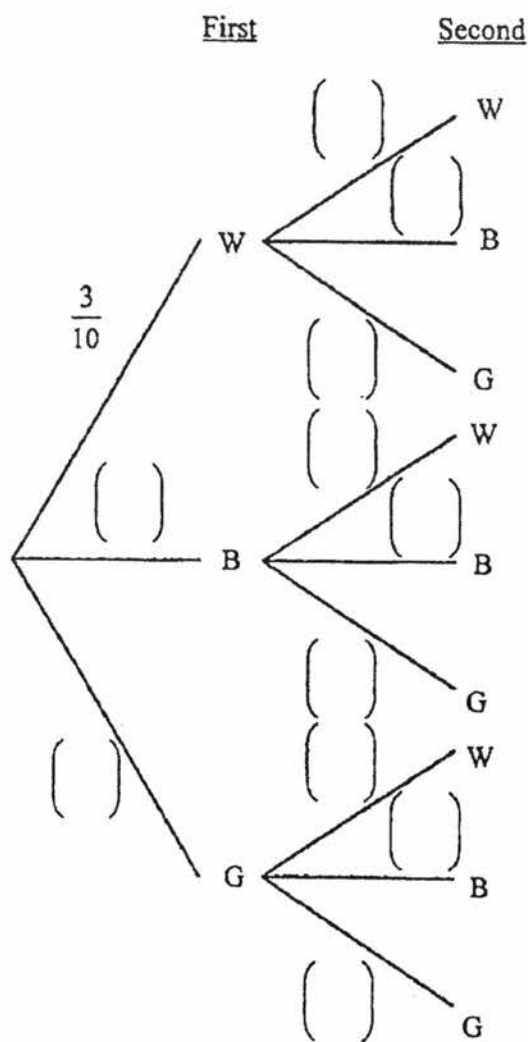
.....

..... [2]

[Turn over

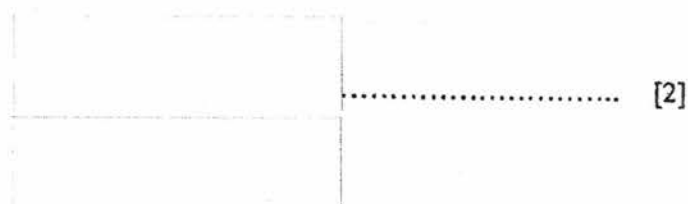
- 23 3 pairs of white socks, 2 pairs of black socks and 5 pairs of grey socks are mixed and placed in a drawer. On a particular day, Yan Xin woke up late. He randomly snatched two socks from the drawer, put them on and rushed to school.

(a) Complete the following tree diagram to show this information.



[2]

- (b) Find, in its simplest form, the probability that Yan Xin has taken
(i) a pair of socks of the same colour,



- 23 (b) (ii) a pair of socks of different colours,

Answer (b)(ii) [1]

Please turn over for Question 24

- 24 (a) By completing the square, express $x^2 - 6x + 5$ in the form $(x-a)^2 - b$.

Answer (a) [2]

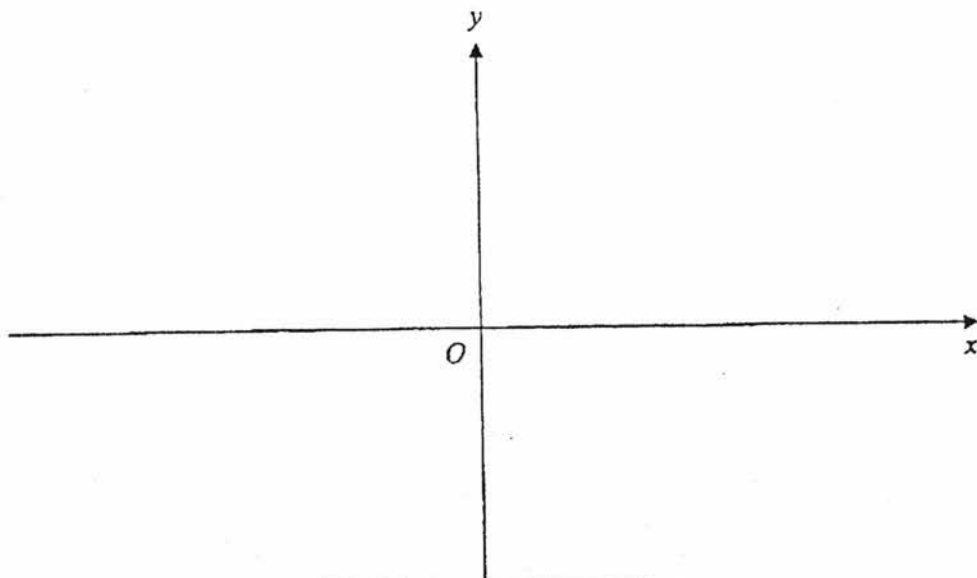
(b) Hence,

- (i) solve the equation $x^2 - 6x + 5 = 0$,

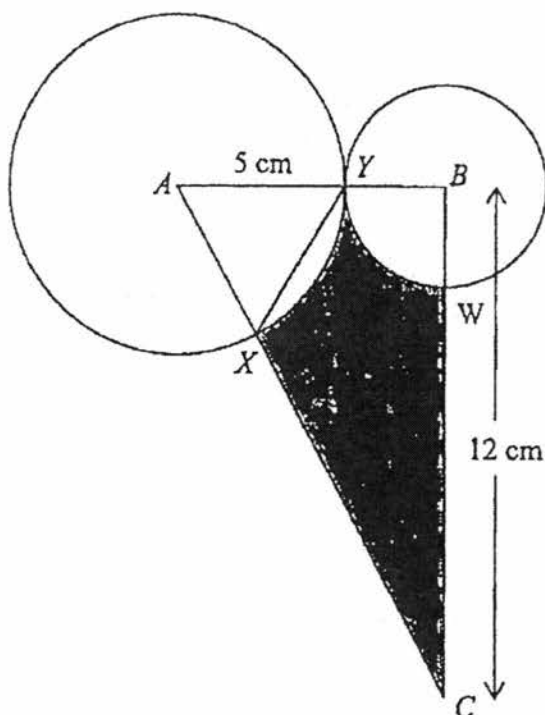
Answer (b)(i) $x = \dots\dots\dots$ or $\dots\dots\dots$ [2]

- (ii) sketch the graph of $y = x^2 - 6x + 5$.

Answer (b)(ii)



[2]



In the diagram, ABC is a right-angled triangle such that two of its vertices A and B are the centres of two circles.

The minor arc length $WY = \frac{3\pi}{2}$ cm, $AY = 5$ cm and $BC = 12$ cm.

- (a) Show that the length of BY is 3 cm.

Answer (a)

[1]

- (b) Find the size of the angle XAY in radians.

Answer (b) $\angle XAY = \dots\dots\dots$ [2]

[Turn over]

- 25 (c) Hence, find the area of the shaded region.

Answer (c) cm^2 [3]

END OF PAPER





XINMIN SECONDARY SCHOOL

新民中学

SEKOLAH MENENGAH XINMIN
Mid-Year Examination 2017

CANDIDATE NAME

CLASS

INDEX NUMBER

MATHEMATICS

4048/2

Paper 2

2 May 2017

Secondary 4 Express / 5 Normal (Academic)

2 hours and 30 minutes

Setter : Mr Bennett Lim

Vetter : Mrs Vivien Tay

Moderator: Mrs Sabrina Phang

Additional Materials: Writing Paper; Graph Paper (1 sheet)

READ THESE INSTRUCTIONS FIRST

Write your name, 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 an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, 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.

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 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.

Errors	Qn No.	Errors	Qn No.
Accuracy		Simplification	
Brackets		Units	
Geometry		Marks Awarded	
Presentation		Marks Penalties	

For Examiner's Use
100

Parent's/Guardian's Signature:

*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. Solve the equation $\frac{3}{x-5} - 5 = \frac{2x}{3-x}$. [4]

2. The Hangzhou-Changsa High-speed Railway runs at a speed of 350 km/h and covers a distance of 933 km between the two cities.

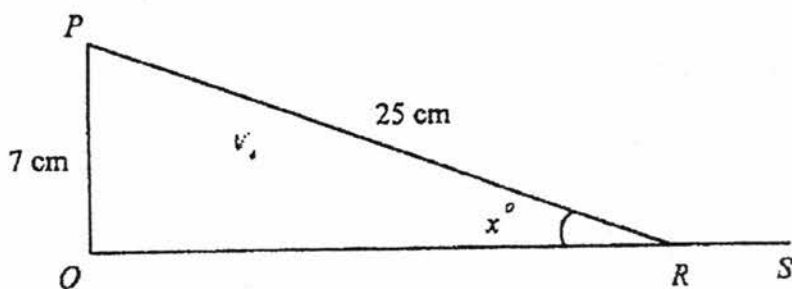
(a) Find the speed of the train in m/s. [2]

(b) Calculate the time taken for the train ride, giving your answer in hours and minutes, correct to the nearest minute. [2]

3. (a) On 12 September 2013, Tyler invested some money in a bank that pays simple interest at a rate of 3% per annum. He received \$573.75 in total interest on 12 December 2015. How much money did Tyler invest in the bank? [2]

(b) Tyler also invested \$12 000 in another bank that pays compound interest at a rate of 2.25% per annum compounded half-yearly. How much money will Tyler get back at the end of 5 years? [2]

4.



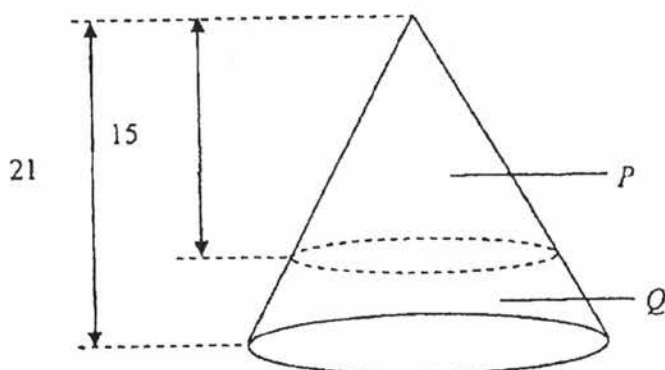
PQR is a right-angled triangle in which $\angle PRQ = x^\circ$, $PQ = 7$ cm and $PR = 25$ cm. The point S lies on QR produced. Write down, as a fraction, the value of

(a) $\cos \angle PRS$, [2]

(b) $\tan(90 - x)^\circ$, [1]

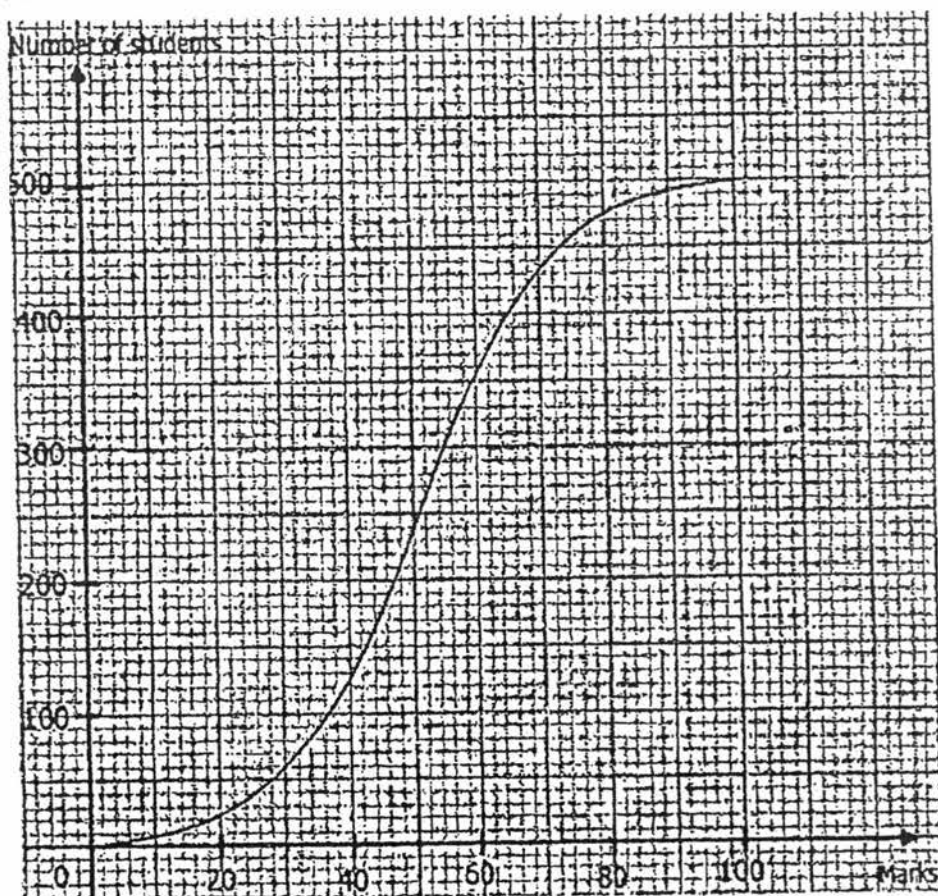
(c) $\sin(180 - x)^\circ$. [1]

5. The following diagram shows an inverted solid cone that is cut up into 2 sections, P and Q , such that section P is a cone similar to the original cone. The height of cone P is 15 cm and the height of the original cone is 21 cm.

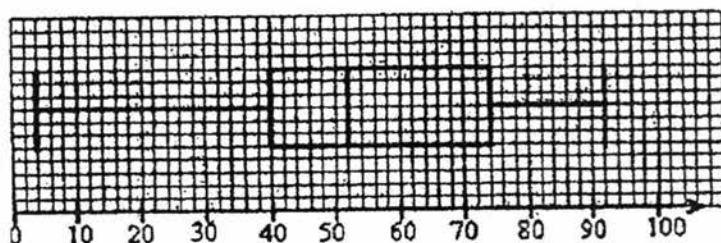


- (a) If the curved surface area of cone P is 250 cm^2 , calculate the curved surface area of the original cone. [2]
- (b) Calculate the ratio of the volume of the original cone to the volume of cone P . [1]
- (c) If the volume of section Q is $v \text{ cm}^3$, calculate the volume of cone P in terms of v . [2]
-
6. The position vector of point A is $\begin{pmatrix} 2 \\ 5 \end{pmatrix}$ and $\overrightarrow{AB} = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$.
- (a) Find $|\overrightarrow{AB}|$. [2]
- (b) Find the coordinates of B . [2]
- (c) Given that $\overrightarrow{CD}$ is parallel to $\overrightarrow{BA}$ and $\overrightarrow{CD} = \begin{pmatrix} k \\ 13.6 \end{pmatrix}$, find the value of k . [3]
-

7. The cumulative frequency curve below illustrates the marks obtained, out of 100, by 500 students in XMSS Mid-Year Examination.

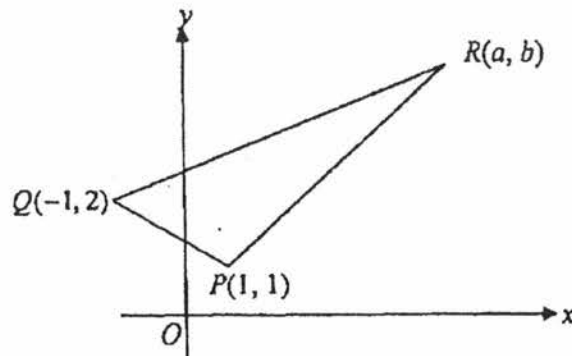


- (a) Find
- (i) the median mark, [1]
 - (ii) the interquartile range, [2]
 - (iii) the percentage of students who scored less than 50 marks. [2]
- (b) Given that 15% of students scored a distinction, find the minimum marks students must score to get a distinction. [1]
- (c) The same 500 students sat for their Preliminary Examination. The box and whiskers diagram below illustrates the marks obtained.



- (i) Which examination was more difficult? Give a reason for your answer. [1]
- (ii) Which examination had more students scoring more than 70 marks? Explain your answer. [1]

8. The figure shows a triangle PQR with $P(1, 1)$, $Q(-1, 2)$ and $R(a, b)$. The gradient of PQ , PR and QR are $-2n$, $2n$ and n respectively.



Find

- (a) the length of PQ , [2]
- (b) the value of n , [2]
- (c) the coordinates of R , [3]
- (d) the equation of line QR . [2]

9. (a) It is given that $A = \begin{pmatrix} 2 & 2 \\ -4 & 6 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 5 \\ 0 & -1 \end{pmatrix}$.

Find

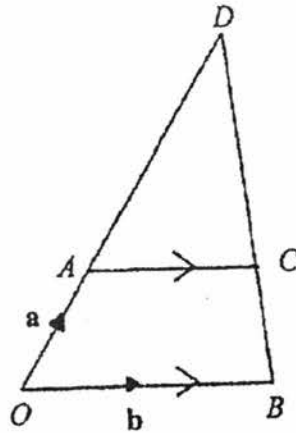
- (i) matrix P if $P = B^2$, [1]
 - (ii) matrix Q if $A + 2Q = 2B$. [3]
- (b) A tour agency records the weekly average number of tour packages to Japan and Korea sold in the months of May and June in 2016. In May 2016, 25 Japan tour packages and 32 Korea tour packages were sold weekly. In June 2016, 30 Japan tour packages and 40 Korea tour packages were sold weekly. This information can be represented by the matrix

$$L = \begin{pmatrix} \text{Japan} & \text{Korea} \\ 25 & 32 \\ 30 & 40 \end{pmatrix} \begin{matrix} \text{May} \\ \text{June} \end{matrix}$$

It is assumed that there are 4 weeks in each month.

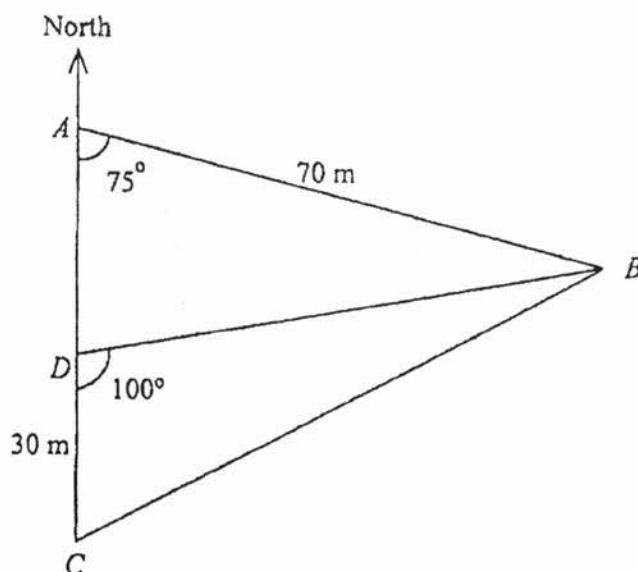
- (i) The prices of the Japan and Korea tour packages in 2016 were \$690 and \$900 respectively. Represent the prices of the tour packages by a 2×1 column matrix N . [1]
- (ii) Evaluate the matrix $R = 4LN$. [2]
- (iii) State what the elements of R represent. [1]
- (iv) The tour agency decides to offer a discount on the tour packages bought in May and June 2017. The agency estimated a 30% increase and 60% increase in the sales of the Japan tour packages and Korea tour packages respectively compared to 2016. By using matrix multiplication involving L , calculate the total estimated number of Japan and Korea tour packages sold weekly in May 2017 and June 2017 respectively. [2]

10. In the diagram, $OACB$ is a trapezium where AC is parallel to OB . The lines OA and BC are produced to the point D such that $\frac{OA}{AD} = \frac{1}{2}$.



- (a) Given that $\vec{OA} = \mathbf{a}$ and $\vec{OB} = \mathbf{b}$, express, as simply as possible, in terms of $\mathbf{a}$ and/or $\mathbf{b}$,
 (i) $\vec{BD}$, [1]
 (ii) $\vec{OC}$. [2]
- (b) Given that $\vec{OE} = 3\mathbf{a} + 2\mathbf{b}$,
 (i) state the name of the quadrilateral $ODEB$, [1]
 (ii) explain why O , C and E lie in a straight line. [2]
- (c) Find
 (i) $\frac{\text{area of } \triangle ADC}{\text{area of } \triangle ODB}$, [2]
 (ii) $\frac{\text{area of } \triangle ODB}{\text{area of quadrilateral } ODEB}$. [3]

11. In a laser tag enclosure, A , B , C and D are points on level ground, with A due north of C and D . $\angle BAD = 75^\circ$, $\angle BDC = 100^\circ$, $AB = 70$ m and $CD = 30$ m.



- (a) Show that the length of $BD = 68.66$ m, correct to 2 decimal places. [2]
- (b) Calculate
- (i) the bearing of D from B , [1]
 - (ii) the length of CB , [2]
 - (iii) the area of $\triangle ABD$. [2]

In a game, Mario at point B ran along the path BA towards point A at a speed of 8 m/s. Sonic at the top of a 20-metre high guard tower at point D spotted Mario at point B .

He fired a shot that hit Mario when he was closest to the guard tower.

Assume that the time taken by the shot to hit the target from the time it was fired was negligible.

- (c) Find
- (i) the angle of depression of Mario from Sonic when the shot was fired, [3]
 - (ii) the time that elapsed from the instant Sonic spotted Mario at point B to the instant Sonic fired the shot. [2]

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

The speed, v , in metres per second of a toy car on a race track propelled by a spring launcher is given by $v = 5 + 4t - t^2$, where t is the time in seconds. The table below shows the corresponding values of t and v .

t	0	1	1.5	2.5	4	5
v	5	8	8.75	8.75	5	0

- (a) Draw the graph of $v = 5 + 4t - t^2$ for $0 \leq t \leq 5$. Use a scale of 2 cm to 1 s on the horizontal t -axis and 2 cm to 1 m/s on the vertical v -axis. [3]
- (b) Use your graph to find the maximum speed reached by the car. [1]
- (c) (i) By drawing a tangent, find the gradient of the graph at the point when $t = 3.5$ s. [2]
 (ii) Use your answer to c(i) to explain what was happening to the car at $t = 3.5$ s. [1]
- (d) (i) By adding a suitable line to your graph, solve $4t - t^2 - 2 = 0$. [4]
 (ii) What do the solutions represent? [1]

13. Mr Mah is a motorcycle shop owner in Singapore who sells brand new motorcycles. He is interested in importing the brand new Kawasaki Z100SX motorcycle from Japan. The total costs to be incurred for importing the motorcycles to Singapore, include the amount payable to the manufacturer, shipping costs, government taxes and duty.

Information that Mr Mah needs is on the following page.
 Mr Mah is interested in importing 20 motorcycles to sell.

- (a) Calculate [1]
 (i) the cost of each motorcycle payable to the manufacturer, [1]
 (ii) the shipping and insurance cost of each motorcycle. [2]
- Mr Mah targets a profit of 15% of his total costs incurred.
 Mr Mah needs to decide how much he should sell each motorcycle.
- (b) Suggest a sensible selling price for each motorcycle. [7]
 Justify your proposed selling price with a **concluding statement**.

Motorcycle Specifications

Motorcycle Model	Kawasaki Z1000 SX
Year	2017
Weight	228 kg

Cost Payable to Manufacturer

Price per Unit (S\$) S\$18,250

Discount for purchases:

> 9 units	2.5%
> 19 units	5.0%
> 29 units	7.5%

Shipping and Insurance Cost:

Net weight (kg)	Cost (S\$)
< 2,000	3,250
2,000 – 3,000	4,000
3,001 – 4,000	4,750
4,001 – 5,000	5,500
5,001 – 10,000	6,000
> 10,000	6,500

The following is extracted from the Singapore Land and Transport Authority (LTA¹) website.

TAX STRUCTURE FOR MOTORCYCLES & SCOOTERS

Registration Fee ² (RF)	S\$140								
Additional Registration Fee ³ (ARF)	Tiered Rate: <table> <tr> <th>Vehicle-OMV⁴</th><th>ARF Rate</th></tr> <tr> <td>First S\$5,000</td><td>15%</td></tr> <tr> <td>Next S\$5,000 (i.e. S\$5,001 to S\$10,000)</td><td>50%</td></tr> <tr> <td>Above S\$10,000</td><td>100%</td></tr> </table>	Vehicle-OMV ⁴	ARF Rate	First S\$5,000	15%	Next S\$5,000 (i.e. S\$5,001 to S\$10,000)	50%	Above S\$10,000	100%
Vehicle-OMV ⁴	ARF Rate								
First S\$5,000	15%								
Next S\$5,000 (i.e. S\$5,001 to S\$10,000)	50%								
Above S\$10,000	100%								
Excise Duty ⁵	12% of OMV								

¹ LTA is responsible for planning, operating, and maintaining Singapore's land transport infrastructure and systems.

^{2,3} The RF and ARF are government taxes to be paid by the importer for the registration of the motorcycles for sale in Singapore.

⁴ OMV (Open Market Value) – Refer to the manufacturer of the motorcycle.

⁵ It is a tax on the cost paid to the manufacturer.

10) a) $k = 10$

b) $2^2 \times 3^4$

11 a) 1: 20000

b) $\cdot 100$

12) $x = 3, y = -4$

13) Singapore

14) $\frac{2x}{(3-x)(x+3)}$

15) $\frac{8}{2x^3}$

16) 40/50

17 a) $p = \frac{26}{x^2+1}$

b) 5 or -5

18 a) $x = 16, y = 36$

b) $p = 8n + 4$

19) a) $n = 12$

b) 150

c) 15°

20) b) $\frac{1}{2} 47, 49, 50$

21 a) 53°

b) 60°

c) 150

22 a) \$ 4241.95

b) 3767.50

23 bi) $\frac{33}{95}$

b) $\frac{56}{95}$

24 a) $(x-3)^2 - 4$

bi) 1 or 5

25 b) 0.983

c) 28.6

$$a) (3a-7)(c-6b)$$

$$b) k=25$$

$$2) 2\frac{1}{2} \leq x < 13$$

$$3a) 2.57 \times 10^{-1}$$

$$b) 3.9156 \times 10^2$$

$$4a) \text{ ~~49~~ } 8$$

$$b) -49$$

$$b) v = \frac{uf}{u-f}$$

7) NO because the line segments between the dots have no meaning

$$8) x = \frac{7}{9}$$

$$9a) n = 3, 5, \dots$$

any odd positive integer > 1

$$b) n = -2, -4, \dots$$

any even negative integer

Q8a) 2.24 b) $n = \frac{1}{4}$

c) $R(7,4)$ d) $4y = x + 9$

9a) i) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ ii) $\begin{pmatrix} 0 & 4 \\ 1 & -4 \end{pmatrix}$

b) i) $N = \begin{pmatrix} 690 \\ 900 \end{pmatrix}$ ii) $\begin{pmatrix} 184 & 200 \\ 226 & 800 \end{pmatrix}$

10) $\begin{pmatrix} 83.7 \\ 103 \end{pmatrix}$

10a) i) $3a - b$

ii) $a + \frac{2}{3}b$

b) Trapezium

ii) $\vec{OE} = 3\vec{OC}$

O, C, E collinear

c) $\frac{4}{9}$

ii) $\frac{1}{3}$

11a) 68.66

b) 260° ii) 79.6 iii) 1020 m^2

e) 34.6°

ii) 7.78

Q1) $x=4$ or 7

2) a) 97.2 m/s b) $2 \text{ h } 40 \text{ min}$

Q3 a) $\$8500$ b) $\$13\,420.43$

4a) $-\frac{24}{25}$, b) $\tan(90-x) = \frac{24}{7}$

c) $\sin(180-x) = \frac{7}{25}$

5a) 450 cm^2

b) $\frac{343}{125}$

c) $\frac{125}{218} \checkmark$

6a) 5 units b) $(-1, 9)$ c) $m = -3.4$
 $k = -10.2$

7a i) 51 (ii) 22 iii) 48%

b) 69

ci) mid-year is more difficult
as median mark is lower

ii) Prelim exam. It has more than 25%
of students scoring 74 m or more higher than
mid year. $\frac{1}{25}$ scoring 62 m or more