

Visit
FREETESTPAPER.com
for more papers



Website: freetestpaper.com

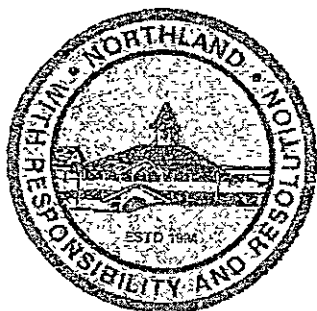


[Facebook.com/freetestpaper](https://www.facebook.com/freetestpaper)



[Twitter.com/freetestpaper](https://www.twitter.com/freetestpaper)

Name :		Index No :	Class :	Calculator Model :
Expected Grade :	Marks Awarded :	80	Actual Grade :	Parent's Signature :



NORTHLAND SECONDARY SCHOOL
Motivated Learners, Assets to Community
Nurturing Minds, Shaping Character, Strengthening Vigour

MID YEAR EXAMINATION 2014	
Subject : MATHEMATICS	Paper : 1
Subject Code : 4016/01	Date : 07 May 2014
Level : Secondary 3 Express	Duration : 2 hours
Setter : Mr Abudaheer Vetted by: Mr Low KM	Time : 1145h – 1345h

READ THESE INSTRUCTIONS FIRST

Write your name, index number, class and calculator model in the spaces at the top of the page.
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 **neatly and clearly** in the space below the question.

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 **80**.

For Examiner's Use

Mathematical Formulae*Compound interest*

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

Mensuration

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

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

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

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

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

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

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

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

For
Examiner's
use

1. (a) Express $\frac{4}{11}$ as a percentage.
(b) Express $21\frac{1}{4}\%$ as a fraction in its simplest form.

Answer (a) % [1]

(b) [1]

2. Evaluate $\frac{5^4}{\sqrt{0.0929} + 0.23}$, leaving your answer in standard form.

Answer [2]

3. Factorise the following completely

(a) $4x^3 - 12x^2y$

(b) $x^3 + 4x - 3x^2 - 12$

Answer (a) [1]

(b) [2]

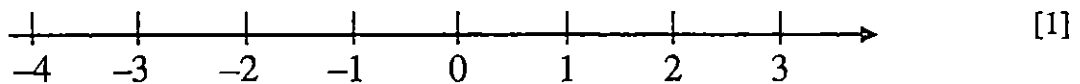
4. (a) Given that $2^{2014} \div 4 = 4^x$, find x .
- (b) Simplify $1 \div 2y^{-1}$.

Answer (a) $x = \dots\dots\dots$ [2]

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

-
5. (a) Solve the inequality $-1 < 2x + 3 \leq 5$.
- (b) Show your solution on the number line below

Answer (b)



Answer (a) $\dots\dots\dots$ [2]

6. At noon on a particular day, the temperature at the foot of a mountain was 12°C and the temperature at the top of the mountain was -6°C .

- (a) Calculate the difference between these two temperatures.
(b) The height of the mountain is 3 600 m.

Given that the temperature changed uniformly with height, calculate the height above the foot of the mountain where the temperature was 0°C .

Answer (a) $^{\circ}\text{C}$ [1]

(b) m [2]

-
7. Solve the simultaneous equations

$$5x + y = 9,$$

$$2x = 3y + 7.$$

Answer $x = \dots\dots\dots$, $y = \dots\dots\dots$ [3]

8. Written as the product of its prime factors,

$$300 = 2^2 \times 3 \times 5^2.$$

- (a) Write 72 as the product of its prime factors.
- (b) Find the lowest common multiple of 300 and 72.
Give your answer as the product of its prime factors.
- (c) Find the greatest integer that will divide both 300 and 72 exactly.

Answer (a) $72 = \dots\dots\dots$ [1]

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

(c) $\dots\dots\dots$ [1]

9. The water waves are travelling along the surface of the ocean at 2.5 m/s.

- (a) Express this speed in kilometres per hour.
- (b) How long does the water wave take to travel one metre?
Express this answer in millisecond.

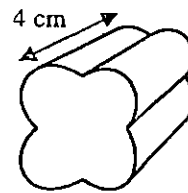
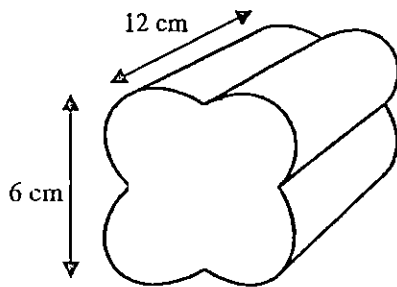
Answer (a) $\dots\dots\dots$ km/h [1]

(b) $\dots\dots\dots$ ms [2]

10. A soap manufacturer makes two geometrically similar bars of soap of uniform cross-section but of different sizes. The larger bar has height 6 cm and length 12 cm and the smaller bar has length 4 cm as shown below.

Larger bar

Smaller bar



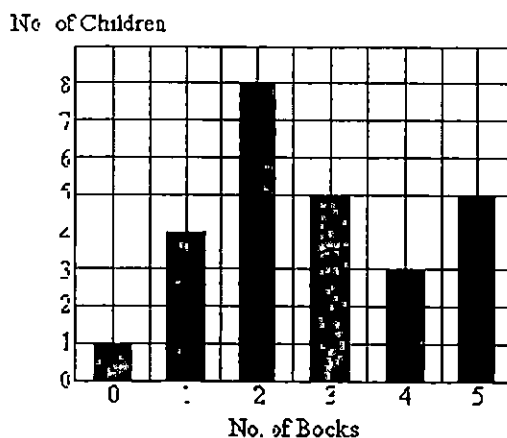
- (a) Find the height of the smaller bar.
- (b) If the cross-sectional area of the bigger bar is 60 cm^2 , calculate the volume of the smaller bar.

Answer (a) cm [1]

(b) cm^3 [2]

11. A group of 26 children were asked how many books they had read in the month of March. The results of the survey are shown in the bar chart below.

- (a) How many books did they read in March?
- (b) Find the percentage of children who have read at least 3 books.



Answer (a) [1]

(b)% [1]

12. A map is drawn to a scale of 1 : 125 000.

- (a) Find the actual distance, in kilometres, represented by 7 cm on the map.
- (b) A new housing development in Yishun has an area of 0.8 km^2 . Find the area represented by the housing development on the map.

Answer (a) km [1]

(b) cm^2 [2]

13. A super computer has a memory capacity of 22 terabytes.

- (a) How many thumb drives each of size 32 gigabytes are required to store the data from the super computer? Give your answer correct to 3 significant figures.
- (b) If a document containing the profile of any employee takes up about 5.21 kilobytes, how many employees profile can be stored in the super computer? Give your answer correct to the nearest million.

Answer (a) [2]

(b)million [2]

14. There are 12 boys and y girls in a group. The probability of selecting a girl from the group is $\frac{2}{5}$.

- (a) Find the probability of selecting a boy from the group.
(b) Find the value of y .

Answer (a) [1]

(b) $y = \dots$ [2]

15. $E = \{x : 6 < x < 20\}$
 $A = \{x : x \text{ is an even number}\}$
 $B = \{x : x \text{ is a multiple of 3}\}$

- (a) List the elements of
(i) A' ,
(ii) $A' \cap B$.
(b) Find the value of $n(A \cup B)$.

Answer (a)(i) [1]

(ii) [1]

(b) [1]

16. The height of a cylinder, h varies inversely as the square of its diameter, d .
When $h = 10$ cm, $d = 4$ cm.

- (a) Find h when d is 8 cm.
(b) Find the percentage decrease in the height when the diameter is doubled.

Answer (a) cm [2]

(b)% [1]

17. A man divided his time between cycling, running and swimming in the ratio 5 : 3 : 4.
If he spent his time equally among all his activities, he would have spent 30 mins' more for running.
What was the total time, in hours, he spent on all his activities?

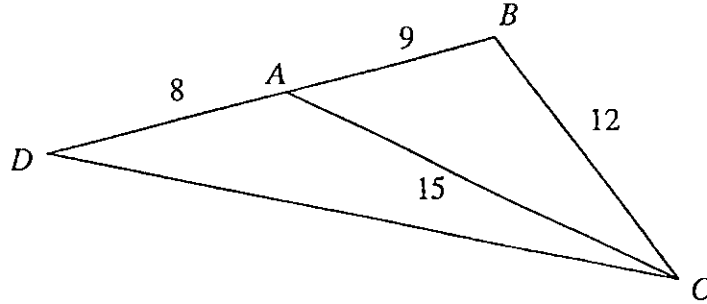
Answerhours [2]

18. (a) Simplify $\frac{9xy^2}{5xz} \div \frac{12y}{20z}$
- (b) Simplify $\frac{3}{x^2-1} - \frac{2}{x+1}$

Answer (a) [2]

(b) [2]

19. In triangle ABC , $AB = 9$ cm, $BC = 12$ cm and $AC = 15$ cm. BA is produced to D and $AD = 8$ cm.

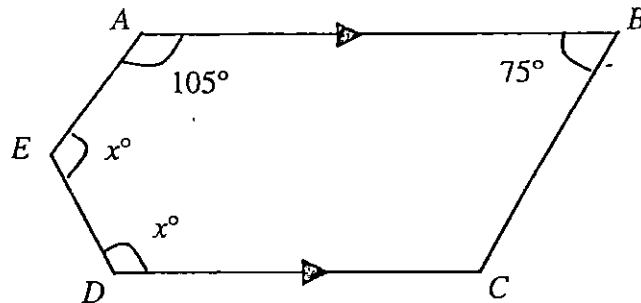


- (a) Show that triangle ABC is a right-angled triangle.
 (b) Find the area of triangle ADC .

Answer (a) [1]

(b) cm^2 [1]

20. (a) In the diagram, $ABCDE$ is a pentagon in which AB is parallel to DC .
 Given that $\angle ABC = 75^\circ$, $\angle BAE = 105^\circ$ and $\angle AED = \angle EDC = x^\circ$, calculate the value of x .



- (b) A polygon has n sides. Two of its exterior angles are 94° and 110° . The remaining $(n - 2)$ exterior angles are each 12° . Find the value of n .

Answer (a) $x =$ [2]

(b) $n =$ [2]

21. Solve the following equations.

(a) $7x - 5 = 3(9 - 4x) - x$

(b) $2p(p + 6) = 0$

Answer (a) $x = \dots\dots\dots$ [2]

(b) $p = \dots\dots\dots$ [1]

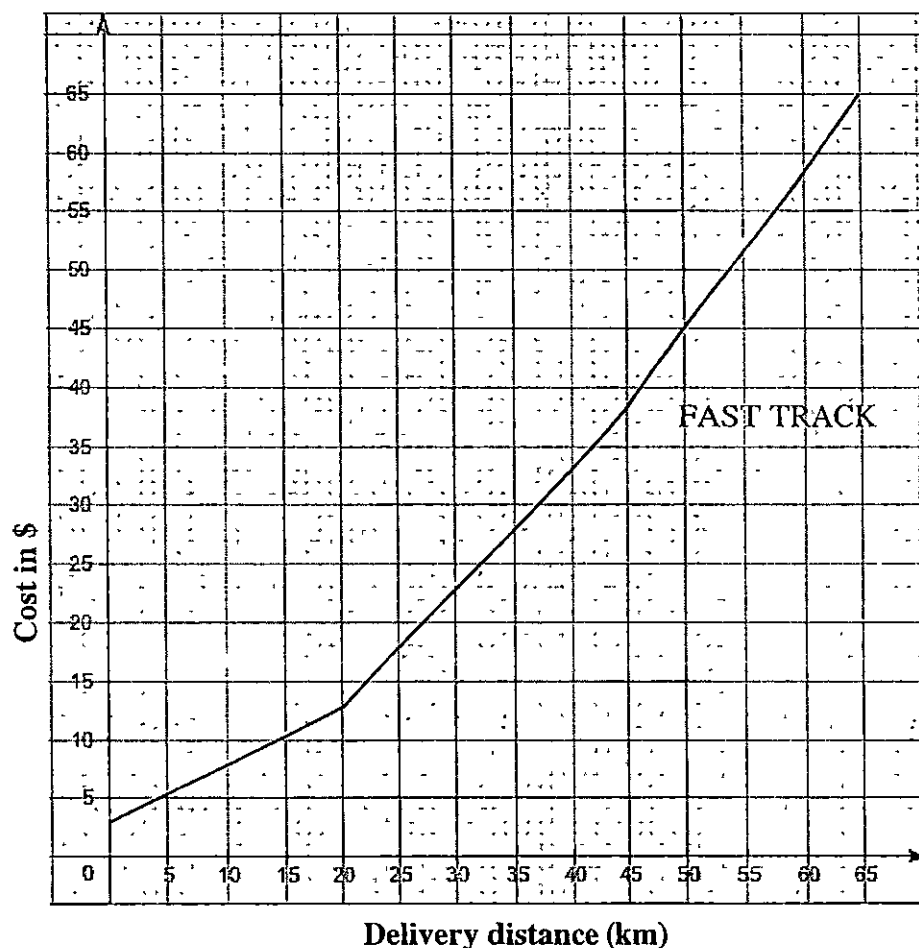
22. (a) Express $x^2 - 2x - 15$ in the form $(x - a)^2 + b$ where a and b are integers.

(b) Hence, solve the equation $x^2 - 2x - 15 = 0$.

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

(b) $x = \dots\dots\dots$ [2]

23. The graph below shows the charges by FAST TRACK, a package delivering company. There is a fixed charge of \$3 and for the first 20 km is charged at 50 cents per km, next 25 km at \$1 per km and any additional km at y dollars per km.



- (a) Find the value of y .
- (b) (i) Find the cost of delivering the package 50 km away.
(ii) If the cost of delivery is \$33, find the distance the package was delivered.
- (c) Another company GHL, delivers packages and charges a flat rate of \$1.50 per km but does not have a fixed charge.
 - (i) Draw a line **on the grid** to represent the charge by GHL. [1]
 - (ii) For a particular distance, the charges from both companies are the same. Find this distance.

Answer (a) $y = \dots\dots\dots$ [2]

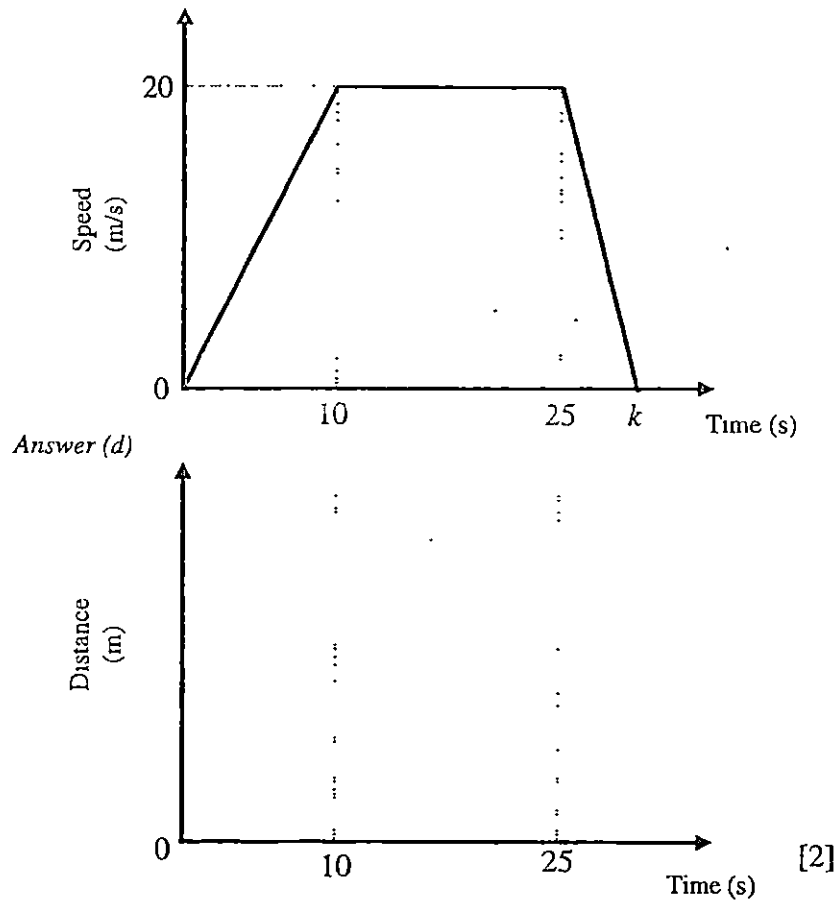
(b) (i) \$ $\dots\dots\dots$ [1]

(ii) $\dots\dots\dots$ km [1]

(c) (ii) $\dots\dots\dots$ km [1]

24. The diagram shows the speed-time graph of a moving object.

- (a) What is the acceleration of the object at time $t = 15$ s.
 (b) Find the speed when $t = 8$ s.
 (c) Find the value of k if the total distance travelled is 450m.
 (d) On the axes in the answer space below, sketch the distance-time graph for the first 25 seconds and indicate clearly, on the vertical axis, the distance travelled at $t = 10$ s and $t = 25$ s.



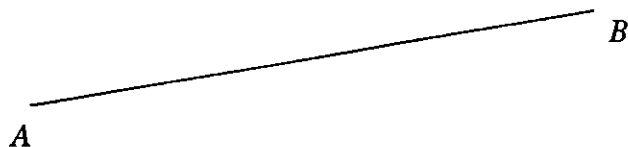
Answer (a) m/s^2 [1]

(b) m/s [1]

(c) $k =$ [2]

25. (a) Construct a triangle ABC where $BC = 8$ cm and $AC = 6$ cm. AB has already been drawn. [1]
- (b) Construct
- (i) the perpendicular bisector of AB , [1]
- (ii) the bisector of angle ABC . [1]
- (c) M is a point that is equidistant from both points A and B and line AB and BC . Mark and label the point M in your diagram. [1]

Answer (a), (b)(i), (b)(ii) and (c)



☺ END OF PAPER 1 ☺
Have you checked your answers!

Name :		Index No :	Class :	Calculator Model :
Expected Grade :	Marks Awarded :	75	Actual Grade :	Parent's Signature :



NORTHLAND SECONDARY SCHOOL
Motivated Learners, Assets to Community
Nurturing Minds, Shaping Character, Strengthening Vigour

MID YEAR EXAMINATION 2014	
Subject : MATHEMATICS	Paper : 2
Subject Code : 4016/02	Date : 15 May 2014
Level : Secondary 3 Express	Duration : 2 hours
Setter : Mr Abudaher Vetted by: Mr Low KM	Time : 0800 h – 1000 h

READ THESE INSTRUCTIONS FIRST

Write your answers and workings on the separate foolscap/graph paper provided.

Write your 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.

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 75.

For Examiner's Use

This paper consists of 7 printed pages including the cover page

Mathematical Formulae*Compound interest*

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

Mensuration

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

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

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

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

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

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

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

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) (i) Factorise $16 - x^2$. [1]

(ii) Simplify $\frac{16 - x^2}{2x^2 + 7x - 4}$. [2]

(b) It is given that $2a = \sqrt{\frac{x}{3x - 2y}}$.

- (i) Find a when $x = 2$ and $y = 1.5$. [1]

- (ii) express x in terms of y and a . [3]

- (c) A toy making company made toy rattles for babies. The cost price of each toy, $\$t$, of making x number of toy rattles is given by a formula

$$t = \frac{5000}{x} + c, \text{ where } c \text{ is a constant.}$$

When 2000 toy rattles were made, each rattle costs \$3.30.

- (i) Find c . [1]
 (ii) Find the cost of each rattle when 500 rattles were produced. [1]
 (iii) If Jonny intends to buy each rattle at \$2.20 from the toy company, how many toy rattles must he order? Give your answer to the nearest integer. [2]
 (iv) Find the range of the number of toy rattles that can be made if the cost of a rattle is to be less than \$8.80. [2]

2. Ravi, Kang and Ahmad visited a car showroom one day and each decided to buy a new Honda car which was priced in the showroom at \$108 000.

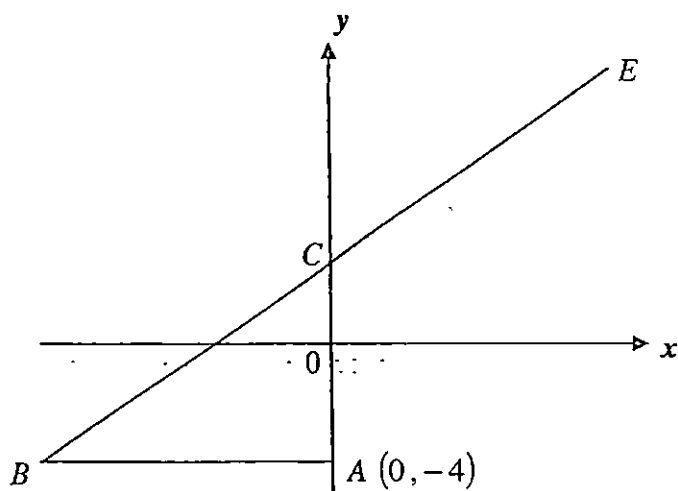
- (a) Ravi paid for his new car in cash and was given a discount. Given that he paid \$84240 for his new car, calculate the percentage discount he received. [2]

- (b) Kang offered his own car in part exchange and the salesman allowed him \$45 000 towards the cost of the new car. He took a loan of the balance amount from a finance company for a period of 5 years. If the finance company charges compound interest at a rate of 1.88 % per annum on car financing, calculate

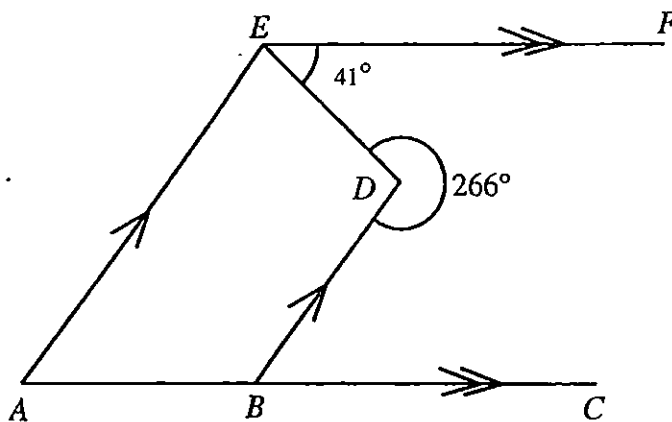
- (i) the amount Kang borrowed, [1]
 (ii) the total interest amount paid by Kang, [2]
 (iii) the amount of each monthly instalment, giving your answer to the nearest dollar. [2]

- (c) Ahmad, being the relative of the salesman, was allowed to pay 40% of the showroom price of the car as a deposit and the balance in equal monthly instalments over a period of 3 years. Calculate the amount of each monthly instalment. [2]

3. (a) In the diagram, A is the point $(0, -4)$ and C is a point on the y -axis. The line BC intersects the horizontal line AB at B .
- Write down the equation of AB . [1]
 - Given that the equation of the line BE is $2y - 5x = 4$, find the coordinates of B and C . [2]
 - Find the length of BC . [2]
 - If the length of $BC = CE$, find the coordinates of E . [1]
 - Find the area of triangle ABE . [2]



- (b) In the diagram, AC is parallel to EF and AE is parallel to BD . Given that $\angle DEF = 41^\circ$ and reflex $\angle BDE = 266^\circ$.



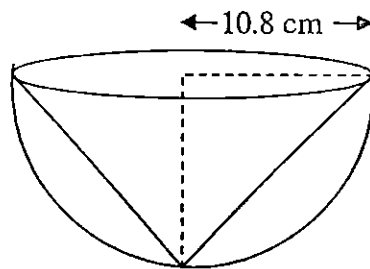
Calculate

- angle AEF [2]
- angle CBD [2]

4. David bought some magazines which cost \$850 altogether.

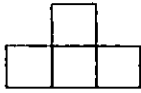
- (a) If the price of each magazine is \$ x , write down an expression for the number of magazines David bought. [1]
- (b) Write down an expression for the number of magazines David can buy if the price of each magazine is decreased by \$5. [1]
- (c) When the price of each magazine is decreased by \$5, an additional of 45 more magazines can be bought. Form an equation in x and show that it reduces to $9x^2 - 45x - 850 = 0$. [3]
- (d) Solve this equation, giving your answers correct to 2 decimal places. [3]
- (e) Hence, find the number of magazines that can be bought at the decreased price. [1]

5. A container in the form of a hemisphere of radius 10.8 cm has a conical part removed as shown in the diagram.



- (a) Calculate
- (i) the slant height of the cone, [2]
- (ii) the total surface area of the container. [3]
- (b) Show that the volume of the container is 1319 cm^3 , correct to the nearest cm^3 . [3]
- (c) The container is made of a metal alloy. Given that the density of the alloy is 5 g/cm^3 , find the mass of the container correct to the nearest kg. [2]

6. A 1-T block consists of 4 squares of 1 cm^2 each and a perimeter of 10 cm.
Study the following pattern with 1-T block arranged to form 2-T block and 3-T block



1-T block



2-T block



3-T block

The values for the perimeter of 1-T block and 2-T block are given below.

Block	1-T	2-T	3-T	4-T
Perimeter	10	14	a	b

- Find the value of a and of b . [2]
 - Find the perimeter of a 20-T block. [1]
 - Write down the perimeter of a n -T block in terms of n . [1]
 - A n -T block has a perimeter of 106 cm, find the value of n . [1]
7. The variables x and y are connected by the equation $y = 2x^2 - 9x + 5$ and some corresponding values are given in the following table:

x	0	1	2	3	4	5	6	7
y	5	p	-5	-4	1	10	q	40

- Calculate the values of p and q . [2]
- Using a scale of 2 cm to represent 1 unit on the x -axis and 1 cm to represent 2 units on the y -axis, draw a horizontal x -axis for $0 \leq x \leq 7$ and a vertical y -axis for $-8 \leq y \leq 40$. [3]
On your axes, plot the points given in the table and join them with a smooth curve.
- Use your graph to find the values of x in $0 \leq x \leq 7$ for which $2x^2 - 9x + 3 = 0$. [2]
- On the same axis, draw the graph of the straight line $y - 2x = -3$. [1]
- Write down the values of x where the graphs $y = 2x^2 - 9x + 5$ and $y - 2x = -3$ intersect. [1]

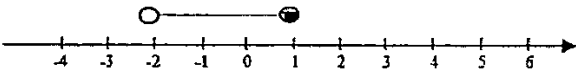
8. The back-to-back stem-and-leaf diagram below compares the marks (out of 50) scored by students in two classes in a Mathematics test.

Class 3EA		Class 3EB
9	0	8
8 7 5 2 2	1	1 3 4 8 9
9 9 6 5 4	2	3 5 5 7 7 9
8 8 4 3	3	2 4 7 8 8
5 4 2 1	4	3 5 5 7 9
0 0	5	

Key: 3|4 means 43 marks

Key: 1|2 means 12 marks

- (a) How many students took the Mathematics test? [1]
- (b) What was the modal score for all the students? [1]
- (c) Calculate the mean score obtained by 3EB. [2]
- (d) Write down the median score of 3EA. [1]
- (e) The distinction mark for the test was 35.
 - (i) Find the percentage of students who scored distinction for the test, from both the classes. [2]
 - (ii) Find the probability that one student chosen at random from class 3EB has scored distinction. [1]

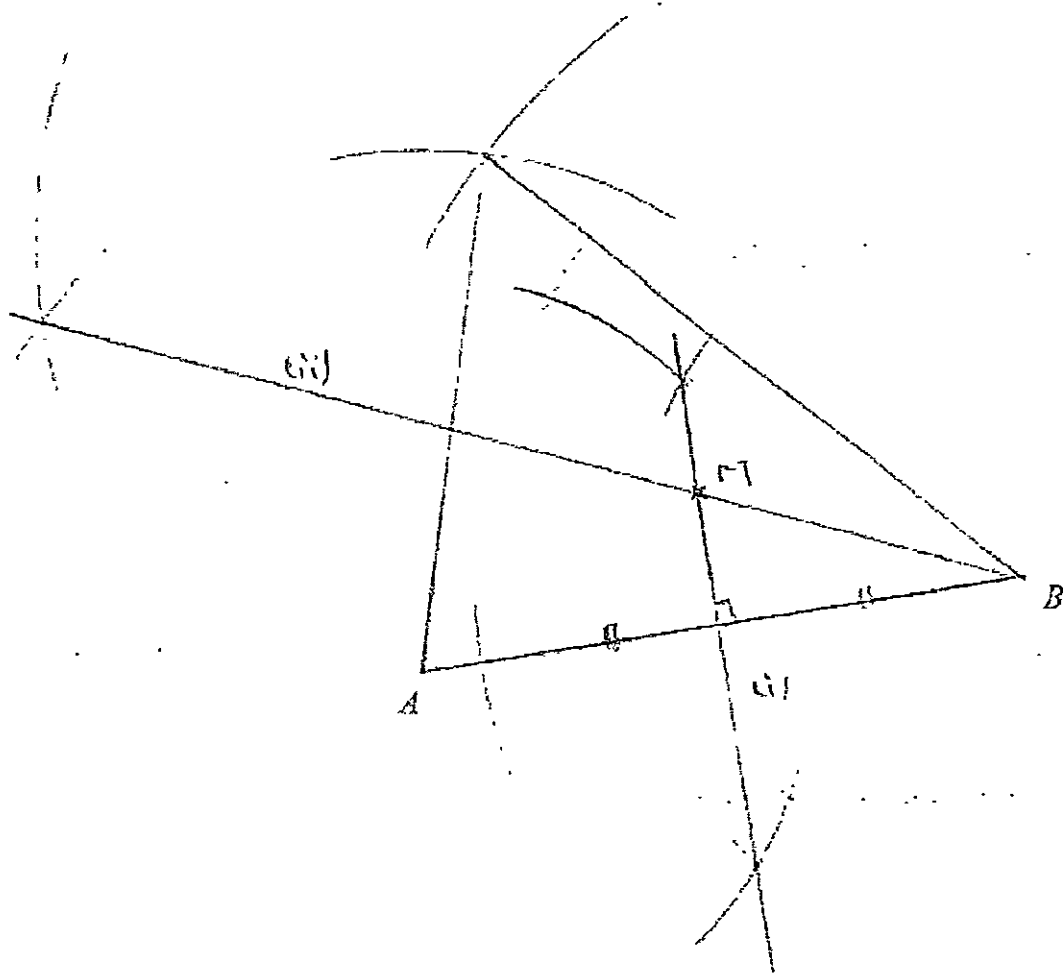
1(a)	36.4 % or $36\frac{4}{11}\%$	B1
(b)	$\frac{17}{80}$	B1
2	1168.672079 $\approx 1.17 \times 10^3$	B1 B1
3(a)	$4x^2(x-3y)$	B1
(b)	$x(x^2+4)-3(x^2+4)$ $= (x-3)(x^2+4)$	B1 B1
4(a)	$2^{2014} \div 2^2 = 2^{2x}$ $2^{2012} = 2^{2x}$ (change to same base) $2x = 2012$ $x = 1006$	B1 B1
(b)	$\frac{y}{2}$	B1
5(a)	$x > -2$ and $x \leq 1$ $-2 < x \leq 1$	B1 B1
(b)		B1
6(a)	18°C	B1
(b)	1 unit ----- 200 m 12 units ---- 2400 m	B1 B1
7	$2x-3y=7$eq 1 $15x+3y=27$eq 2 eq 1 + eq 2 $(2x-3y)+(15x+3y)=7+27$ $17x=34$ $x=2$ Sub $x=2$ into eq 1 $2(2)-3y=7$ $y=-1$	M1 A1 A1
8(a)	$72 = 2^3 \times 3^2$	B1
(b)	$2^3 \times 3^2 \times 5^2$	B1
(c)	12	B1
9(a)	9 km/h	B1

(b)	1m ----- 0.4 s 1m ----- 400 ms	M1 A1
10(a)	2 cm	B1
(b)	$\frac{1}{9} = \frac{x}{60}$ $x = 6\frac{2}{3} \text{ cm}^2$ Vol. of small bar(prism) = $6\frac{2}{3} \times 4 = 26\frac{2}{3} \text{ cm}^3$ or 26.7 cm^3	M1 A1
11(a)	72	B1
(b)	50 %	B1
12(a)	8.75 km	B1
(b)	1 cm^2 ----- 1.5625 km^2 0.512 cm^2 ----- 0.8 km^2	B1 B1
13(a)	$\frac{22 \times 10^{12}}{32 \times 10^9}$ ≈ 688	M1 A1
(b)	$\frac{22 \times 10^{12}}{5.21 \times 10^3}$ $\approx 4223 \text{ million}$	M1 A1
14(a)	$\frac{3}{5}$	B1
(b)	$\frac{12}{12+y} = \frac{3}{5}$ or $\frac{y}{12+y} = \frac{2}{5}$ $36+3y=60$ or $5y=24+2y$ $y=8$ or $y=8$ $12 \div 3/5 = 20$ $20 \times 2/5 = 8$	M1 A1
15(a)(i)	$A' = \{7, 9, 11, 13, 15, 17, 19\}$	B1
(ii)	$A' \cap B = \{9, 15\}$	B1
(b)	8	B1
16(a)	$h = \frac{160}{d^2}$ $h = \frac{160}{8^2}$ $h = 2.5 \text{ cm}$	M1 A1
(b)	75 %	B1
17	1 unit ----- 30 mins 12 units ----- 360 mins = 6 hrs	M1 A1

18(a)	$\frac{9xy^2}{5xz} \times \frac{20z}{12y}$ $= \frac{180xy^2z}{60xyz}$ $= 3y$	M1 A1
(b)	$\frac{3}{(x+1)(x-1)} - \frac{2}{(x+1)}$ $= \frac{3-2(x-1)}{(x+1)(x-1)}$ $= \frac{5-2x}{(x+1)(x-1)}$	M1 A1
19(a)	$AC^2 = 15^2 = 225$ $AB^2 + BC^2 = 9^2 + 12^2 = 225 = AC^2$ Since $AB^2 + BC^2 = AC^2$ and it obeys Pythagoras theorem, triangle ABC is a right-angled triangle.	B1
(b)	48 cm ²	B1
20(a)	$540 - 105 - 75 - 105 = 255$ $2x = 255$ $x = 127.5$	M1 A1
(b)	$94 + 110 + 12(n-2) = 360$ $12(n-2) = 156$ $n-2 = 13$ $n = 15$	M1 A1
21(a)	$7x - 5 = 27 - 12x - x$ $20x = 32$ $x = 1.6$	M1 A1
(b)	$p = 0$ or -6	B1
22(a)	$(x-1)^2 - 16$	B1
(b)	$(x-1)^2 - 16 = 0$ $(x-1)^2 = 16$ $x-1 = \pm 4$ $x = 5 \text{ or } -3$	M1 A1

23(a)	$y = \frac{65 - 38}{20}$ $y = 1.35$	M1 A1
(b)(i)	\$45 (Using graph) or \$44.75 (Using equation)	B1
(ii)	40 km	B1
(c)(i)		
(c)(ii)	3 km	B1
24(a)	0 m/s ²	B1
(b)	16 m/s	B1
(c)	$\frac{1}{2} \times (k + 15) \times 20 = 450$ $k = 30$	M1 A1
(d)	Answer: (d)	B1, B1

25(a) -
(c)

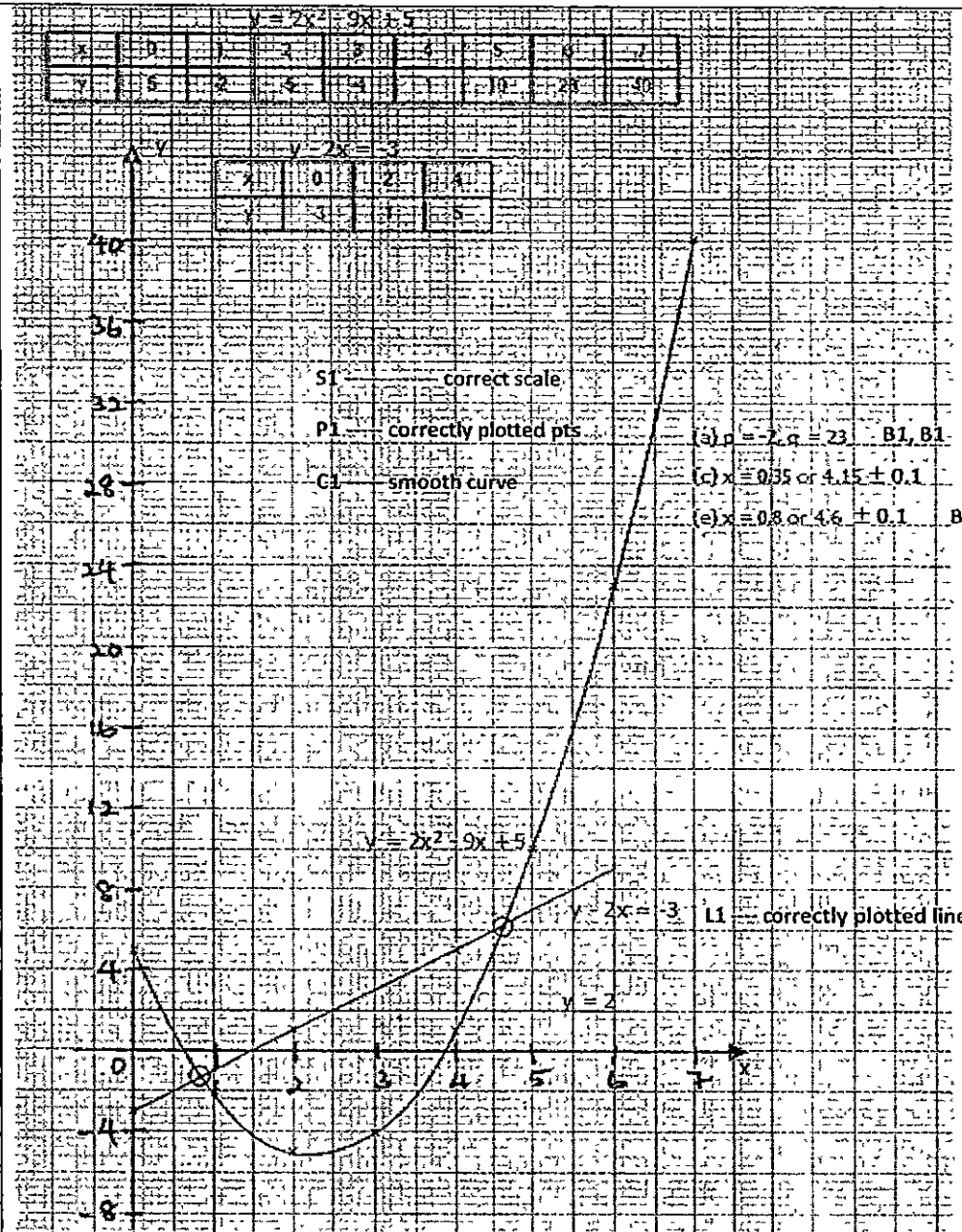


1(a)(i)	$(4-x)(4+x)$	B1
(ii)	$\frac{(4-x)(4+x)}{(x+4)(2x-1)}$ $= \frac{4-x}{2x-1}$	M1 A1
(b)(i)	$2a = \sqrt{\frac{2}{6-3}}$ $a \approx 0.408$	B1
(ii)	$4a^2 = \frac{x}{3x-2y}$ $4a^2(3x-2y) = x \dots\dots\dots M1$ $12a^2x - 8a^2y = x$ $12a^2x - x = 8a^2y$ $x(12a^2 - 1) = 8a^2y \dots\dots\dots M1$ $x = \frac{8a^2y}{12a^2 - 1} \dots\dots\dots A1$	
(c)(i)	$c = 0.8$	B1
(ii)	$t = \$10.80$	B1
(iii)	$2.2 = \frac{5000}{x} + 0.8$ $x \approx 3571$	M1 A1
(iv)	$\frac{5000}{x} + 0.8 < 8.8$ $\frac{5000}{x} < 8$ $x > 625$	M1 A1
2(a)	$\frac{23760}{108000} \times 100 = 22\%$	M1, A1
(b)(i)	Borrowed amount = $\$108000 - \$45000 = \$63000$	B1
(ii)	$\text{Total amount} = 63000 \left(1 + \frac{1.88}{100}\right)^5$ $\approx \$69148.89$ $\text{Interest amount} = 69148.89 - 63000$ $= \$6148.89$	M1 A1
(iii)	$\text{monthly instalment} = \frac{69148.89}{5 \times 12}$ $\approx \$1152$	M1 A1

(c)	60% ----- \$64 800 $\text{monthly instalment} = \frac{64800}{3 \times 12}$ $= \$1800$	B1 B1
3(a)(i)	$y = -4$	B1
(ii)	$y = 2.5x + 2$ C(0, 2)B1 B(x, -4) $-4 = 2.5x + 2$ $x = -2.4$ B(-2.4, -4)B1	
(iii)	Length of BC = $\sqrt{6^2 + (2.4)^2}$ $\approx 6.46 \text{ units}$	M1 A1
(iv)	E(2.4, 8)	B1
(v)	$\text{Area of triangle ABE} = \frac{1}{2}(2.4)(12) = 14.4 \text{ units}^2$	M1, A1
(b)(i)	$360 - 266 = 94^\circ$ $\text{Angle AEF} = 180 - 94$ $= 86^\circ (\text{int angles})$	B1 B1
(ii)	$\text{Angle CBD} = 94 - 41$ $= 53^\circ (\text{alt angles})$	B1 B1
4(a)	$\frac{850}{x}$	B1
(b)	$\frac{850}{x-5}$	B1
(c)	$\frac{850}{x-5} - \frac{850}{x} = 45$M1 $\frac{850x - 850(x-5)}{x(x-5)} = 45$ $\frac{4250}{x(x-5)} = 45$M1 $45x(x-5) = 4250$ } M1 $45x^2 - 225x - 4250 = 0$ $9x^2 - 45x - 850 = 0$ (shown)	
(d)	$x = \frac{45 \pm \sqrt{45^2 - 4(9)(-850)}}{2(9)}$ $= \frac{45 \pm \sqrt{32625}}{18}$ $\approx 12.53 \text{ or } -7.53$	M1 A1, A1

(e)	112.811 Round down to 112 magazines.	B1
5(a)(i)	$\sqrt{10.8^2 + 10.8^2} \approx 15.3 \text{ cm}$	M1, A1
(ii)	<i>Total surface area of container</i> $= 2 \times \pi \times (10.8)^2 + \pi \times (10.8) \times (15.2735)$ $= 1251.088$ $\approx 1250 \text{ cm}^2$	M1, M1 A1
(b)	<i>Volume of container</i> $= \frac{2}{3} \times \pi \times (10.8)^3 - \frac{1}{3} \times \pi \times (10.8)^2 \times (10.8)$ $= 1319.167$ $\approx 1319 \text{ cm}^3$ (shown)	M1, M1, M1
(c)	<i>mass = density</i> $\times$ <i>Volume</i> $= 5 \times 1319.167$ $\approx 6596.837 \text{ g}$ $\approx 7 \text{ kg}$	M1 A1
6(a)	a = 18; b = 22	B1, B1
(b)	Perimeter = 86	B1
(c)	$4n + 6$	B1
(d)	$n = 25$	B1

7(a) –
(e)



(a) $p = -2, q = 23$ B1, B1
(c) $x = 0.35$ or 4.15 ± 0.1 B1, B1
(e) $x = 0.8$ or 4.6 ± 0.1 B1

8(a)	43	B1
(b)	38	B1
(c)	$\frac{647}{22}$ ≈ 29.4	M1 A1
(d)	29	B1
(e)(i)	$\frac{16}{43} \times 100$ $\approx 37.2\%$	M1 A1
(ii)	$\frac{8}{22} = \frac{4}{11}$	B1