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

NORTHLAND SECONDARY SCHOOL

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Nurturing Minds, Shaping Character, Strengthening Vigour

MID YEAR EXAMINATION 2014	
Subject : MATHEMATICS	Paper : 1
Subject Code: 4042/01	Date : 7th May 2014
Level : Secondary 3 Normal Academic	Duration : 2 hours
Setter : Mr Ou Jianwen Vetter: Mrs Chang Ying Ying	Time : 1145 - 1345

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.
The number of marks is given in brackets [ ] at the end of each question or part question.

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 total of the marks for this paper is **80**.

You are expected to use a scientific calculator to evaluate explicit numerical expressions.
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.

For Examiner's Use

Answer **all** the questions.

1. A list of numbers is shown below.

$\sqrt{3}, \frac{1}{6}, 7, 4, 8$

From the list, which is a perfect cube?

Answer ..... [1]

2. Evaluate $\frac{\sqrt{32.5} \times 42.58}{\sqrt{25.88 + 19.45}}$, giving your answers to 4 significant figures.

Answer ..... [1]

3. (a) Express 0.34 as a fraction in its lowest terms.

(b) Express $\frac{4}{9}$ as a recurring decimal.

(c) Express $\frac{19}{40}$ as a percentage.

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

(b) ..... [1]

(c) .....% [1]

4. Simplify the following

(a) $\frac{2m+n}{3} + \frac{m-4n}{2}$,

(b) $\frac{10a}{3} \div \frac{15a}{6}$.

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

(b) ..... [2]

---

5. Solve the following

(a) $4y - 11 = 7 + 2y$,

(b) $(x+2)(3x-5) = 0$.

Answer (a) $y =$..... [2]

(b) $x =$..... [2]

---

6. Factorise the following completely

(a) $x^2 - 9y^2$,

(b) $2pq - 5p + 4qr - 10r$.

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

(b) ..... [2]

---

7. (a) Solve $5p < 18$.

(b) Hence write down,

(i) the largest integer value of p such that $5p < 18$,

(ii) the largest prime number p such that $5p < 18$.

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

(b) (i) $p =$ ..... [1]

(ii) $p =$ ..... [1]

---

8. (a) Express $\sqrt[5]{p^3}$ in index notation.

(b) Simplify $(2p)^2 \times 9pq^3$.

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

(b) ..... [2]

---

9. (a) By completing the square, $x^2 - 16x - 10$ can be expressed in the form $(x + p)^2 + q$. Find p and q.

(b) Hence or otherwise, solve $x^2 - 16x - 10 = 0$. Give your answer correct to 2 decimal places.

Answer (a) $p =$ ....., $q =$ ..... [2]

(b) $x =$ ..... or ..... [2]

10. 168 expressed as a product of its prime factors is $2^3 \times 3 \times 7$.

(a) Express 90 as a product of its prime factors.

(b) Use the results in (a) to find

(i) the highest common factor of 168 and 90,

(ii) the lowest common multiple of 168 and 90,

(iii) the smallest integer k such that $168k$ is a perfect square.

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

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

(ii) ..... [1]

(iii) $k =$ ..... [1]

---

11. The first 4 terms of a sequence are 3, 7, 11, 15, ...

Find

(a) the next 2 terms,

(b) the n^{th} term,

(c) the 53^{rd} term.

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

(b) ..... [1]

(c) ..... [1]

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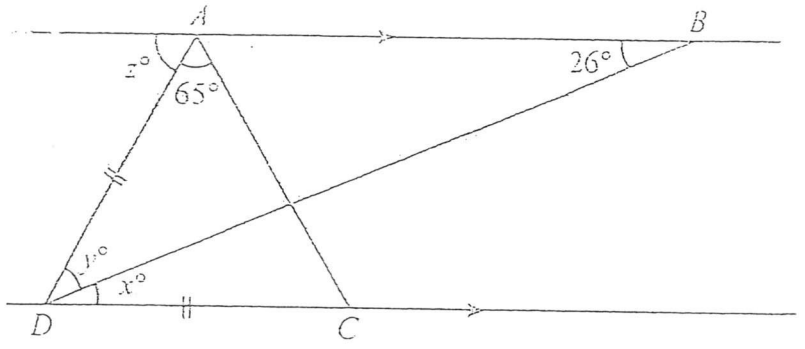
12. In the diagram, AB is parallel to DC.
$DA = DC$, $\angle DAC = 65°$ and $\angle ABD = 26°$.



Find

(a) x,

(b) y,

(c) z.

Answer (a) $x =$ ..... [1]

(b) $y =$ ..... [1]

(c) $z =$ ..... [1]

13. A motorist travelled 150 km at 60 km/h.

He then travelled at 84 km/h for the next $3\frac{1}{2}$ h.

Calculate

(a) the time taken for the first part of the journey ,

(b) the distance travelled in the second part of the journey,

(c) his average speed for the whole journey.

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

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

(c) ..... *km / h* [1]

---

14. At 09 00, the temperature at a certain place was $-8°C$.

At 12 00, the temperature had risen to $-2°C$.

(a) Find the difference between these two temperatures.

(b) After 1200, the temperature continued to increase by $1.5°C$ every hour. What was the temperature at 15 00?

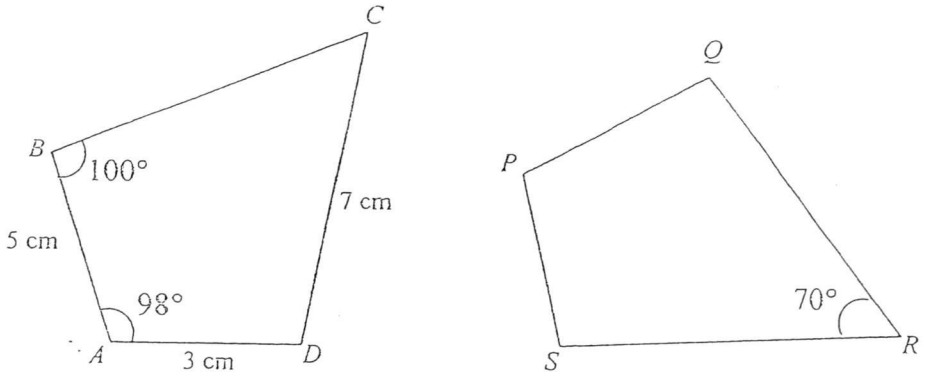
Answer (a) ..... ^0C [1]

(b) ..... ^0C [1]

15. A camp is planned for a group of 20 students and food is bought to last for 15 days. If the number of students is increased to 25, how long would this same amount of food last?

Answer ..... days [2]

16. In the diagram, quadrilaterals $ABCD$ and $PQRS$ are congruent.



Find

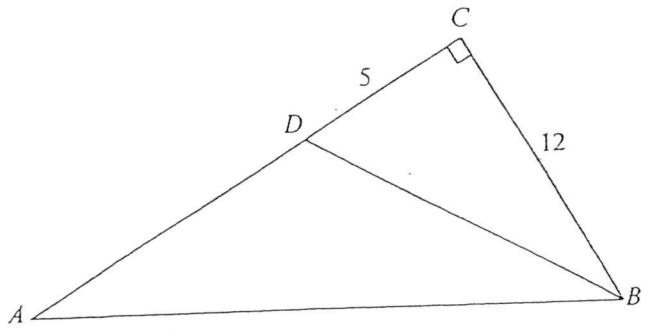
(a) the length of PS,

(b) $\angle PSR$.

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

(b) ..... ° [1]

17. ABC is a triangle in which $\angle ACB$ is a right angle.
D is a point on AC, $BC = 12$ km and $CD = 5$ km.



Giving each answer as a fraction, find

(a) $\tan \angle CDB$,

(b) $\sin \angle DBC$,

(c) $\cos \angle ADB$.

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

(b) ..... [1]

(c) ..... [1]

18. A wall measuring 2.5 m by 6 m requires 3 litres of paint.

(a) Calculate the amount of paint used per square metre.

(b) If 5 *l* of paint costs \$35, calculate the cost of painting four such walls.

Answer (a) ..... l/m^2 [1]

(b) \$ ..... [2]

19. A length of 10 cm on a map represents an actual distance of 20 km.

(a) Calculate the scale of the map in the form 1 : n.

(b) A road is 45 km long.
Find, in centimetres, the length of the road on the map.

(c) On the map, a school has an area of 3 cm^2.
Calculate, in square kilometres, the actual area of the school.

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

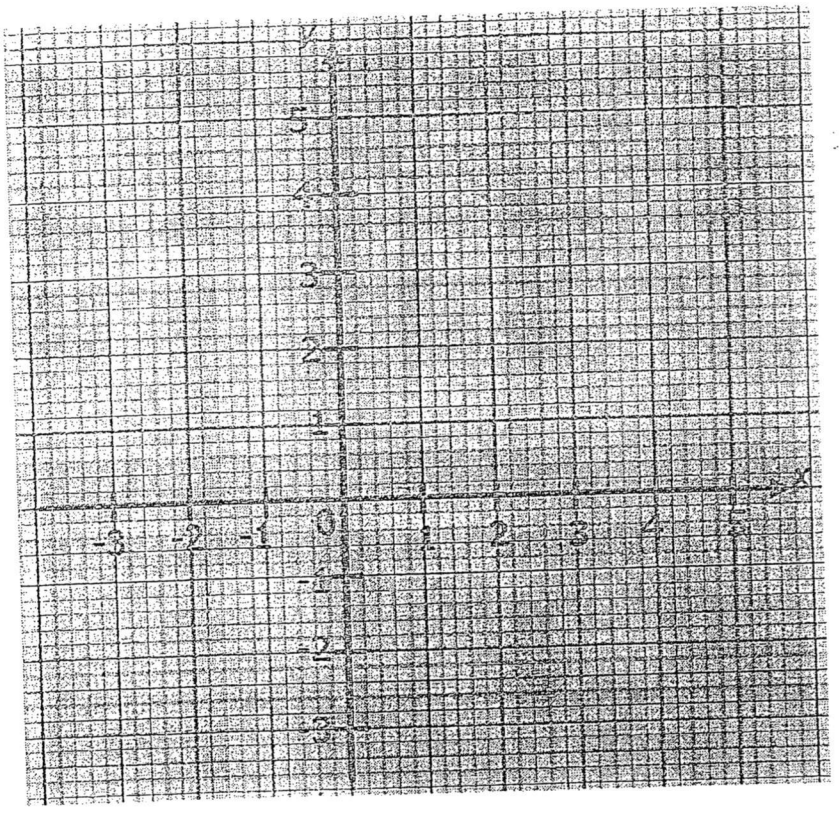
(b) ..... *cm* [1]

(c) ..... km^2 [2]

20. (a) Complete the table of values for $y = 2x + 1$. [2]

x	-2	-1	0	1	2
y	-3		1	3	

(b) On the grid below, plot the graph of $y = 2x + 1$. [2]



(c) Use your graph to estimate:

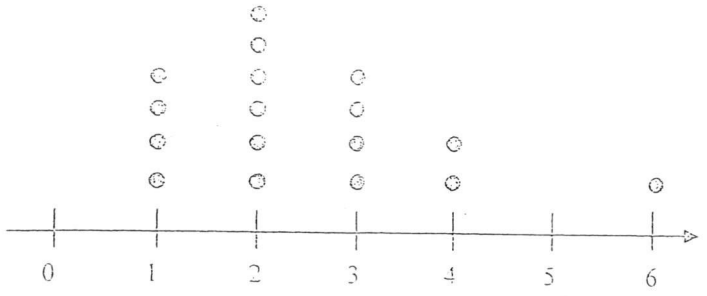
(i) the value of y when $x = 0.5$,

(ii) the value of x when $y = 4$.

Answer c (i) $y =$..... [1]

c (ii) $x =$..... [1]

21. The following dot diagram shows the number of hours some students spent on the computer per day.



(a) How many students were there?

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

(b) Find the modal number of hours spent on computer per day.

Answer (b) ..... hours [1]

(c) Find the percentage of students who spent more than 3 hours on the computer per day.

Answer (c) .....% [1]

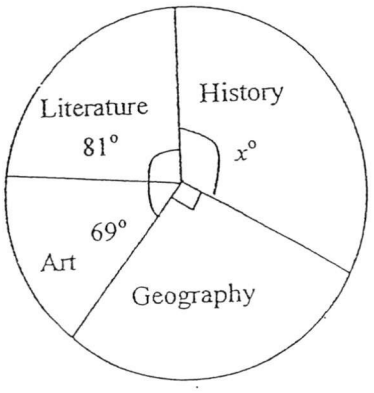
(d) Find the mean number of hours spent on computer per day.

Answer (d) ..... [2]

(e) If a student is chosen at random, what is the probability that the student spends 2 hours or less on the computer per day?

Answer (e) ..... [1]

22. A survey about their favourite subject was carried out amongst the students in a secondary school.
The four subjects that received the most votes are Literature, History, Geography and Art.



Given that 300 students liked Geography, calculate

(a) the total number of students in the school,

(b) the value of x,

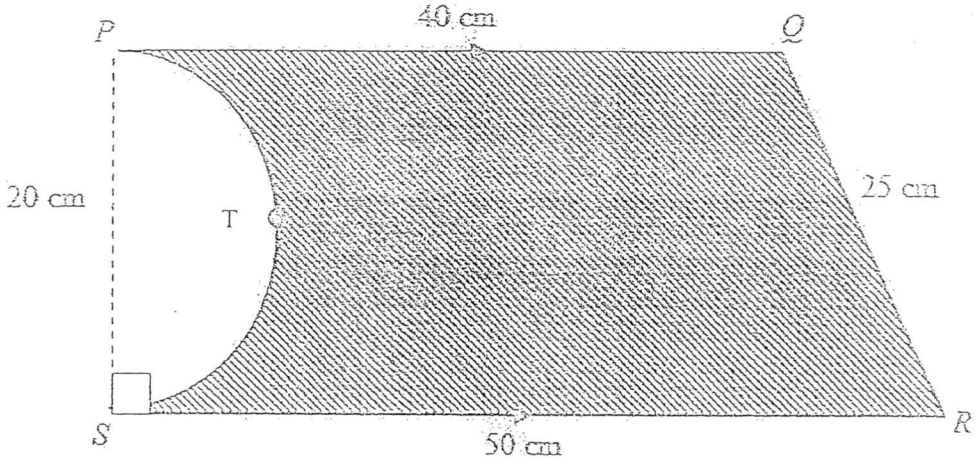
(c) the percentage of the students who liked Literature.

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

(b) ..... [1]

(c) ..... % [1]

23. The figure shows a piece of cardboard in the shape of a trapezium $PQRS$ with a semi-circular piece cut off along PTS.
It is given that $PQ = 40$ cm, $QR = 25$ cm,
$RS = 50$ cm, $PS = 20$ cm and $\angle PSR = 90°$.



Taking $\pi = 3.142$, find

(a) the perimeter of the shaded portion,

(b) the area of the shaded portion.

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

(b) ..... cm^2 [3]

24. (a) Construct triangle PQR such that $PQ = 10\,\text{cm}, QR = 7\,\text{cm}$ and $\angle PQR = 75°$ [1]

(b) Construct

(i) the perpendicular bisector of PQ, [1]

(ii) the bisector of angle PQR. [1]

(c) X is a point which is equidistant from points P and Q and equidistant from lines PQ and QR. Mark point X clearly on the diagram. [1]

~ End of Paper 1 ~

1.	8	B1
2.	36.05	B1
3(a)	$\frac{17}{50}$	B1
(b)	0.4	B1
(c)	47.5%	B1
4(a)	$\frac{4m+2n}{6}+\frac{3m-12n}{6}$ $=\frac{7m-10n}{6}$	M1 A1
(b)	$\frac{10a}{3}\times\frac{6}{15a}$ $\frac{4}{3}$	M1 A1
5(a)	$2y=18$ $y=9$	M1 A1
(b)	$x=-2$ & $x=\frac{5}{3}$	B1, B1
6(a)	$(x+3y)(x-3y)$	B2
(b)	$2pq-5p+4qr-10r$ $=p(2q-5)+2r(2q-5)$ $=(2q-5)(p+2r)$	M1 A1
7(a)	$p<6$	B1
(b)(i)	5	B1
(b)(ii)	5	B1
8(a)	p^3	B1
(b)	$(2p)^2\times 9pq^3$ $=4p^2\times 9pq^3$ $=36p^3q^3$	M1 A1

9(a)	$x^2-16-10=x^2-16x+\left(\frac{-16}{2}\right)^2-\left(\frac{-16}{2}\right)^2-10$ $=x^2-16x+(-8)^2-(-8)^2-10$ $=(x-8)^2-74$ $\therefore p=-8, q=-74$	B1, B1
(b)	$(x-8)^2-74=0$ $(x-8)^2=74$ $x-8=\pm\sqrt{74}$ $x-8=\sqrt{74}$ or $x-8=-\sqrt{74}$ $x=8+\sqrt{74}$ $x=8-\sqrt{74}$ $x=16.60$ $x=-0.60$	B1,B1
10(a)	$90=2\times3^2\times5$	B1
b(i)	HCF=6	B1
b(ii)	LCM= 2520	B1
b(iii)	$168k=2^3\times3\times7k$ $=2^2\times2^2\times3^2\times7^2$ $k=2\times3\times7$ $=42$	B1
11(a)	19, 23	B1
(b)	$4n-1$	B1
(c)	211	B1
12(a)	$x=26°$ (alt $\angle$s)	B1
(b)	$y=180°-(65°+65°)-26°$ $=24°$ (sum of angles in triangle)	B1
(c)	$z=26°+24°$ $=50°$	B1
13(a)	Tim taken for the first part of the journey $=\frac{150}{60}$ $=2\frac{1}{2}$ h	B1

(b)	Distance traveled In the second part of the journey $= 84 \times 3\frac{1}{2}$ $= 294$ km	B1
(c)	Average speed for the whole journey $= \frac{150 + 294}{2\frac{1}{2} + 3\frac{1}{2}}$ $= \frac{444}{6}$ $= 74$ km/h	B1
14(a)	6°C	B1
(b)	2.5°C	B1
15	$\frac{20}{25} = \frac{x}{15}$ $25x = 300$ $x = 12$ days	M1 A1
16(a)	$PS = AD$ $= 3$ cm	B1
(b)	$\angle PQR = \angle ABC = 100°$ $\angle BCD = \angle QRS = 70°$ $\angle ADC = 360° - 100° - 98° - 70°$ ($\angle$ sum of quad) $= 92°$ $\therefore \angle PSR = 92°$	B1
17(a)	$2\frac{2}{5}$ or $\frac{12}{5}$	B1
(b)	$\frac{5}{13}$	B1
(c)	$-\frac{5}{13}$	B1

18(a)	0.2 l/m^2	B1
(b)	$\frac{12}{5} \times \$35$ $= \$84$	M1 A1
19(a)	(MapScale) 10 cm : 20 km 1 cm : 2 km 1 cm : $(2 \times 1000 \times 100)$ cm 1 : 200000	B1
(b)	Map scale is 1 cm: 2 km Length on Map $= \left(\frac{45}{2} \times 1\right)$ cm $= 22.5$ cm Alternatively, Length on Map $= \left(\frac{45}{20} \times 10\right)$ cm $= 22.5$ cm	B1
(c)	Area Scale $= (1 \times 1)\ cm^2 : (2 \times 2)\ km^2$ $= 1\ cm^2 : 4\ km^2$ Actual Area $= (3 \times 4)\ km^2$ $= 12\ km^2$	M1 A1
20(a)	-1,5	B1,B1
(c)(i)	y=2	B1
c(ii)	x=1.5	B1
21(a)	17	B1
(b)	2 hours	B1
(c)	$\frac{3}{17} \times 100\%$ $= 17.6\%$	B1

(d)	$\frac{(4\times1)+(6\times2)+(4\times3)+(2\times4)+(1\times6)}{17}$	M1
	$=2.47$	A1
(e)	$\frac{10}{17}$	B1
22(a)	$\frac{300}{90}\times360^\circ$	B1
	$=1200$	
(b)	120	B1
(c)	$22\frac{1}{2}\%$	B1
23(a)	Perimeter $=40+25+50+\frac{1}{2}\pi(20)$	M1
	$=146.42$ cm	A1
(b)	$\frac{1}{2}(20)(90)=900\text{ cm}^2$	M1
	$\frac{1}{2}(3.142)(10^2)=157.1\text{cm}^2$	M1
	$=900-157.1$	
	$=742.9\text{ cm}^2$	A1

Name :			Index No :	Class :	Calculator Model :
Expected Grade :	Marks Awarded :	60	Actual Grade :	Parent's Signature :	

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MID YEAR EXAMINATION 2014	
Subject : MATHEMATICS	Paper : 2
Subject Code: 4042/02	Date : 14th May 2014
Level : Secondary 3 Normal Academic	Duration : 2 hours
Setter : Mr Ou Jianwen Vetter: Mrs Chang Ying Ying	Time : 0900 – 1100

READ THESE INSTRUCTIONS FIRST

Write your answers and working on the separate Answer Paper provided.
Write your index number 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.

Section A
Answer **all** questions.

Section B
Answer **two** questions.

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.

You are expected to use a scientific calculator to evaluate explicit numerical expressions.
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.

At the end of the examination, fasten all your work securely together.

Additional Materials: Answer Papers

Section A (44 marks)

Answer **all** the questions in this section.

1. (a) If $a = 4, b = -2$ and $c = -1$, evaluate $\frac{a^2 - b}{c}$. [1]

(b) Expand and simplify $5(x + 1) - (x - 2)$. [2]

(c) Expand and simplify $(3x - 2y)^2$. [2]

---

2. The diameter of a circular plant cell is 837 micrometres.

(a) Express 837 micrometres in metres, giving your answer in standard form. [1]

(b) Find the circumference of the circular plant cell, giving your answer in the standard form. (Take $\pi = 3.142$) [2]

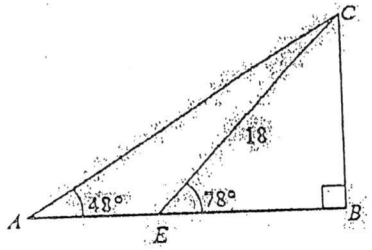
---

3 (a) Solve $2^{2x} \times 8^x = 256$. [2]

(b) Solve $\frac{3}{y} = \frac{5}{y - 7}$. [2]

(c) Sally and John shared the cost of an apartment in the ratio 3:5. Given that the cost of the apartment is $ 300 000, find the amount that John has to pay. [2]

4.



In the diagram, $EC = 18$ cm, $\angle BEC = 78°$ $\angle BAC = 48°$ and $\angle CBE = 90°$.

Calculate

(a) the length of BC, [2]

(b) $\angle ACE$, [1]

(c) the length of AE. [3]

---

5. (a) Factorise $2x^2 + 9x - 5$. [2]

(b) Hence express $\dfrac{3}{2x-1} + \dfrac{6x}{2x^2+9x-5}$ as a single fraction in its simplest form. [2]

---

6. Given that d is directly proportional to t and $d = 100$ when $t = 2$, find

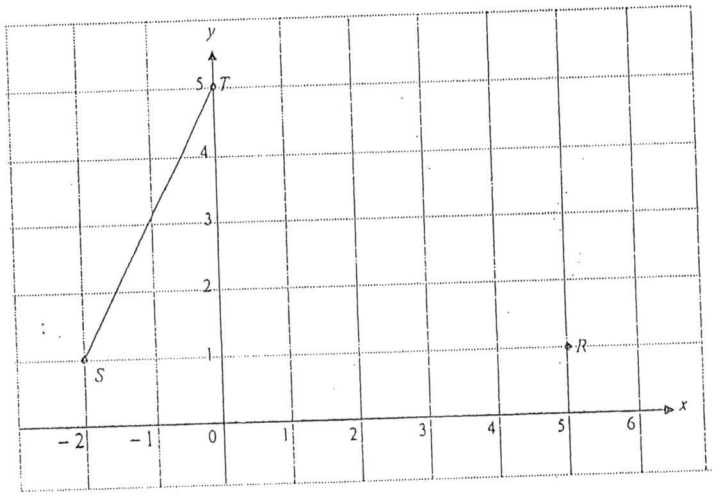
(a) find an equation relating d and t. [2]

(b) find the value of d when $t = 5$. [1]

(c) find the value of t when $d = 50$. [1]

---

7. On the grid below are points $S(-2, 1)$ and $T(0, 5)$.



(a) Calculate the length of line ST. [2]

(b) Find the gradient of the line ST. [2]

(c) Find the equation of the line ST. [1]

(d) The point $R(5, 1)$ is plotted on the grid.
Calculate the area of triangle RST. [2]

---

8. The total cost of x adult tickets and y child tickets for a moon cake festival was \$204. An adult ticket cost \$8 and a child ticket cost \$5.

(a) Write down an equation, in terms of x and y, to represent the total cost of the tickets bought. [1]

(b) Given that the total number of tickets bought was 30, write down an equation, in terms of x and y, to represent the total number of tickets bought. [1]

(c) Find the values of x and y. [3]

---

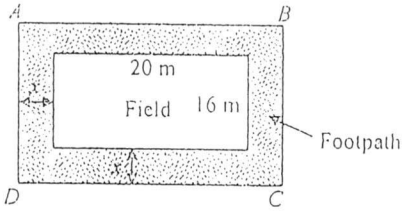
9 (a) Calculate the sum of all the interior angles of a pentagon. [2]

(b) Each of the exterior angle of a regular polygon is 20°. How many sides does this regular polygon have? [2]

Section B (16 marks)

Answer any two questions from this section. Each question carries 8 marks.

10.



A rectangular field is 20 m long and 16 m wide. It is surrounded by a footpath of uniform width x m.

(a) Write down and simplify an expression in terms of x for the

(i) length of the footpath from A to B, [1]

(ii) width of the footpath from B to C. [1]

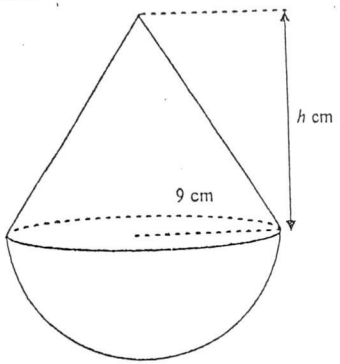
(b) Given that the total area of the field and the footpath is 472 m^2, form an equation and show that it reduces to $x^2 + 18x - 38 = 0$. [2]

(c) Solve the equation $x^2 + 18x - 38 = 0$, giving your answers correct to 2 decimal places. [3]

(d) Find the length of AB. [1]

---

11. The container below consists of a hollow cone of height h cm glued to a hollow hemispherical base of radius 9 cm.



(a) Find the volume of the hemisphere in terms of π. [2]

The volume of the entire container is 1836π cm^3.

(b) Show that the height of the cone, h, is 50cm. [2]

(c) Find the external curved surface area of the cone, giving your answer correct to the nearest square centimetres. [2]

(d) Initially the container is completely filled with water, but the water is leaking from the container at a constant rate of 0.02 litres per second. Calculate the time taken, in seconds, to empty the container of water. [2]
[1 litre = 1000 cm^3]

12 (a) The diagram below shows a sequence of patterns formed by matchsticks. (Length of one matchstick is ⟷)

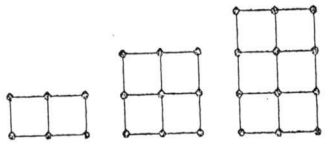


Figure 1 Figure 2 Figure 3

(i) Draw the diagram for Figure 4. [1]

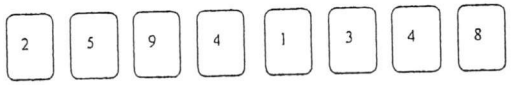
(ii) The table below shows the number of matchsticks needed to form each figure. Write down the values of a and b. [2]

Figure number	No of matchsticks needed to form the figure
1	7
2	12
3	17
4	a
5	b

(iii) Write down an expression, in terms of n, to represent the number of matchsticks needed in Figure n^{th}. [1]

(iv) Hence, or otherwise, find the number of matchsticks needed in Figure 100^{th}. [1]

(b) A box contains 8 cards as shown below. A card is drawn at random from the box.



Find the probability that the number on the card drawn is

(i) more than 5, [1]

(ii) a prime number, [1]

(iii) '6'. [1]

1(a)	$\frac{4^2-(-2)}{-1}=-18$	B1
(b)	$5(x+1)-(x-2)$ $=5x+5-x+2$ $=4x+7$	M1 A1
(c)	$(3x-2y)^2$ $=(3x-2y)(3x-2y)$ $=9x^2-6xy-6xy+4y^2$ $=9x^2-12xy+4y^2$	M1 A1
2(a)	837×10^{-6} $=8.37\times10^{-4}m$	B1
(b)	$\Pi D=3.142\times8.37\times10^{-4}$ $=2.629854\times10^{-3}m$	M1v A1
3(a)	$2^{2z}\times2^{3z}=2^8$ $2z+3z=8$ $5z=8$ $z=\frac{8}{5}$ or $1\frac{3}{5}$ or 1.6	M1 A1
(b)	$\frac{3}{y}=\frac{5}{y-7}$ $3(y-7)=5y$ $3y-21=5y$ $-2y=21$ $y=-10\frac{1}{2}$ or -10.5	M1 A1
(c)	1 unit = \$ 300 000 /8 = \$ 37 500 5 units = \$ 37 500 x 5 = \$187 500	M1 A1

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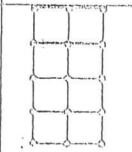
4(a)	$\sin 78=\frac{BC}{18}$ $BC=18\times\sin 78$ $BC=17.606656813cm$ $=17.6cm$	M1 A1
(b)	$\angle ACE=180°-48°-102°$ $=30°$	B1
(c)	$\tan 48=\frac{BC}{AB}$ $AB=\frac{17.606656813}{\tan 48}$ $AB=15.853105cm$ $\cos 78=\frac{BE}{CE}$ $BE=18\times\cos 78$ $BE=3.742410cm$ Length of $AE=AB-BE$ $=15.85309-3.74240$ $=12.110694cm$ $=12.1$ cm	M1v M1 A1
5(a)	$(2x-1)(x+5)$	B2
(b)	$\frac{3}{2x-1}+\frac{6x}{(2x-1)(x+5)}$ $=\frac{3(x+5)+6x}{(x+5)(2x-1)}$ $=\frac{9x+15}{(x+5)(2x-1)}$	M1 A1
6(a)	$d=kt$ When $t=2$, $d=100$. $100=k(2)$ $k=50$ $d=50t$	B1 B1

(b)	When $t = 5$, $d = 50t$ $d = 50(5)$ $= 250$	B1
(c)	When $d = 50$, $d = 50t$ $50 = 50(t)$ $t = 1$	B1
7(a)	$\sqrt{(-2-0)^2 + (1-5)^2}$ $\sqrt{4+16}$ = 4.47 units (3 S.F)	M1 A1
(b)	$Grad = \frac{5-1}{0-(-2)}$ $= 2$	M1 A1
(c)	y=2x+5	B1
(d)	$\frac{1}{2} \times 7 \times 4$ $= 14 units^2$	M1 B1
8(a)	$8x + 5y = 204$	B1
(b)	$x + y = 30$	B1
(c)	$x + y = 30 \quad -(1)$ $8x + 5y = 204 \quad -(2)$ $5x + 5y = 150 \quad -5(1)$ $(2) - 5(1),\ 3x = 54$ $x = 18$ $sub\ x = 18$ int o (1) $18 + y = 30$ $y = 12$	M1 A1 A1
9(a)	Sum of int. $\angle$s $= (5-2) \times 180°$ $= 540°$	M1 A1

(b)	No. of sides $= \frac{360°}{20}$ $= 18$	M1 B1
10(a)(i)	$20 + 2x$	B1
(ii)	$16 + 2x$	B1
(b)	$(2x+20)(16+2x) = 472$ $4(x^2 + 10x + 8x + 80 - 118) = 0$ $(x^2 + 18x - 38) = 0$ $x^2 + 18x - 38 = 0$	M1 M1
(c)	$x = \frac{-18 \pm \sqrt{18^2 - 4(1)(-38)}}{2}$ $x = 1.908712$ or $x = -19.90871$ $= 1.91$ $= -19.91$ As the length cannot be negative x= -19.91 is rejected.	M1 B2
(d)	20+(2 x 1.9087712) = 23.81742 m = 23.8 m	B1
11(a)	Volume of the hemisphere $= \frac{2}{3}\pi(9)^3$ $= 486\pi$ cm^3	M1 A1
(b)	$486\pi + \frac{1}{3}\pi(9)^2 h = 1836\pi$ $h = \frac{1836 - 486}{\frac{1}{3}(9)^2}$ $h = 50$	M1 B1
(c)	Let the slant height be l cm. $l = \sqrt{50^2 + 9^2}$ $= 50.80354318$ External curved surface area of cone $= \pi \times 9 \times 50.803$ $= 1436.43642$ $= 1436\ cm^2$ (to nearest cm^3)	M1 A1

(d)	20 cm^3 of water leaks in 1 second. 1836π cm^3 of water leaks in $\frac{1836\pi}{20} = 288$ s (3 sig. fig.)	M1 A1
12(a)(i)	 Figure 4	B1
(a)(ii)	$a = 17+5$ $= 22,$ $b = 22 + 5$ $= 27$	B1, B1
(a)(iii)	$5n + 2$	B1
(a)(iv)	502 matchsticks	B1
b(i)	$\frac{2}{8} = \frac{1}{4}$	B1
b(ii)	$\frac{3}{8}$	B1
b(iii)	0	B1