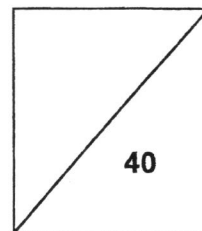




**NORTH VISTA SECONDARY SCHOOL**  
**END-OF-YEAR EXAMINATIONS 2018**



**NAME:** \_\_\_\_\_ (       ) **CLASS:** \_\_\_\_\_

**SUBJECT: MATHEMATICS (PAPER 1)**

**DATE: 4 OCTOBER 2018**

**LEVEL/STREAM: SECONDARY 2 EXPRESS**

**TIME: 1 HOUR**

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**READ THESE INSTRUCTIONS FIRST**

Write your register 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.

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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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 40.

<i>For Examiner's Use</i>	
<b>Category</b>	<b>Question No.</b>
Accuracy	
Brackets	
Fractions	
Units	
Others	
<b>Marks Deducted</b>	

Answer all the questions.

1 Simplify

(a)  $-4(2x-5)+2-(x-1)$  ,

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

(b)  $(2x+1)^2-(x-3)^2$ .

Answer (b) ..... [2]

---

2 It is given that  $a+b=5$  and  $ab=-3$ .

Find the value of  $a^2+b^2$ .

Answer ..... [2]

---

- 3 Write as a single fraction in its simplest form  $\frac{2x}{(2x-3)^2} - \frac{1}{2x-3}$ .

*Answer* ..... [2]

---

- 4 Factorise

(a)  $\frac{x}{2} - 3xy + x^2$ ,

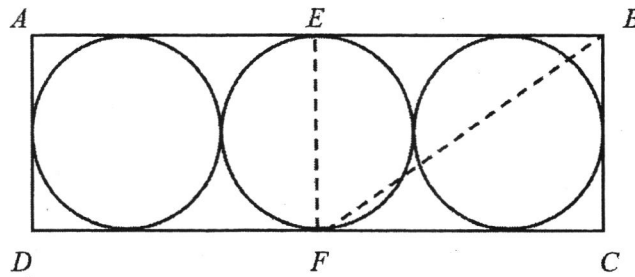
*Answer* (a) ..... [1]

(b)  $2p(1-4q) - (4q-1)$ .

*Answer* (b) ..... [2]

---

- 5 The diagram below shows three identical circles fitted inside a rectangle. The diameter of each circle is 10 cm. Line  $EF$  passes through the centre of the circle.



Find the length of line  $BF$ .

Answer ..... cm [2]

- 6 It is given that  $V = \frac{1}{3} \pi r^2 h$ .

(a) Find the value of  $V$  when  $\pi = \frac{22}{7}$ ,  $r = 9$  and  $h = 21$ .

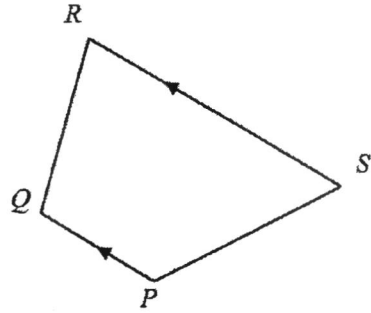
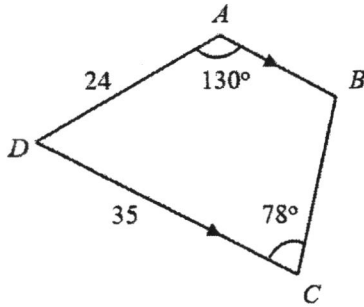
Answer (a)  $V =$  ..... [1]

(b) Express  $r$  in terms of  $V$ ,  $\pi$  and  $h$ .

Answer (b) ..... [2]



- 7 Trapezium  $ABCD$  is congruent to the trapezium  $PQRS$ . It is given that  $AD = 24$  cm,  $CD = 35$  cm, angle  $DAB = 130^\circ$  and angle  $BCD = 78^\circ$ .



Find

- (a)  $PS$ ,

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

- (b) angle  $PQR$ .

Answer (b) .....<sup>o</sup> [1]

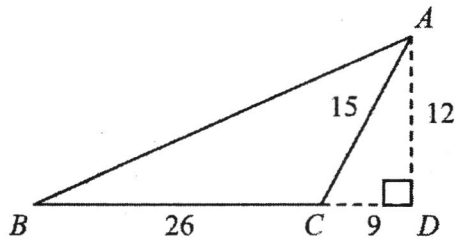
- 8 Solve the simultaneous equations.

$$2x - 3y = 12$$

$$4x + 5y = -9$$

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

- 9 It is given that  $AC = 15$  cm,  $AD = 12$  cm,  $BC = 26$  cm and  $CD = 9$  cm.



- (a) Expressing as a fraction in its lowest form, find  
 (i)  $\tan \angle ACD$ ,  
 (ii)  $\sin \angle BAD$ .

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

(ii) ..... [2]

- (b) Find the shortest distance from  $C$  to  $AB$ .

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

- 10 A map of Singapore has a scale of 1: 250 000.
- (a) The length of the Singapore river on the map is 1.2 cm.  
Calculate the actual length, in kilometres, of the Singapore river.

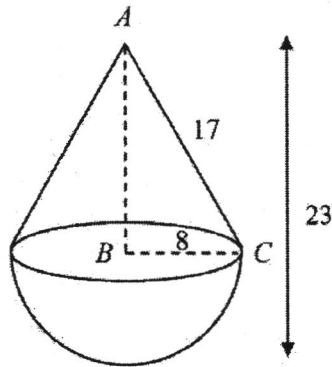
*Answer (a)* ..... km [1]

- (b) The area of Sentosa is  $4.71 \text{ km}^2$ .  
Calculate, the area, in square centimetres, of Sentosa on the map.

*Answer (b)* .....  $\text{cm}^2$  [2]

---

- 11 The solid shown below consists of a solid cone attached to a solid hemisphere. The base radius of the cone is 8 cm and the height of the solid is 23 cm.



- (a) Given that the slant height of the cone is 17 cm, explain why angle  $ABC = 90^\circ$ .

Answer .....

.....

.....

..... [2]

- (b) Calculate
- (i) the total surface area of the solid,

Answer (b)(i) .....  $\text{cm}^2$  [2]

- (ii) the volume of the solid.

Answer (b)(ii) .....  $\text{cm}^3$  [2]

12 The table below shows the pocket money of 20 students, rounded off to the nearest whole number.

23	24	23	25	20
21	20	24	22	21
23	25	25	20	23
23	20	21	22	25

(a) Draw a dot diagram to represent the information in the table.

*Answer*



(b) Find the modal amount of pocket money.

[2]

*Answer* (b) \$ ..... [1]

(c) Explain two limitations of using a dot diagram.

*Answer* ..... [2]

(d) Is a line graph a suitable way to represent the data? Explain your answer.

*Answer* ..... [1]

**Question that are similar to P2 and thus removed:**

- 11** The following stem-and-leaf diagram shows the English and Mathematics scores of a class of 20 students.

Leaves for English scores	Stem	Leaves for Mathematics scores
	3	8
0 3 5	4	9 5 3
2 3 4 4 6	5	9 7 5 4 4 4 3
5 6 7 7 8 9	6	8 7 6 4 3 0
3 4 5 6 9	7	5 4 1
0	8	

Key: 5 | 0 means 50 marks

- (a) Find the modal score in the Mathematics test.

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

- (b) Find the ratio of students who scored more than 50 marks in the English test to those in the Mathematics test.

Answer (b) ..... : ..... [2]

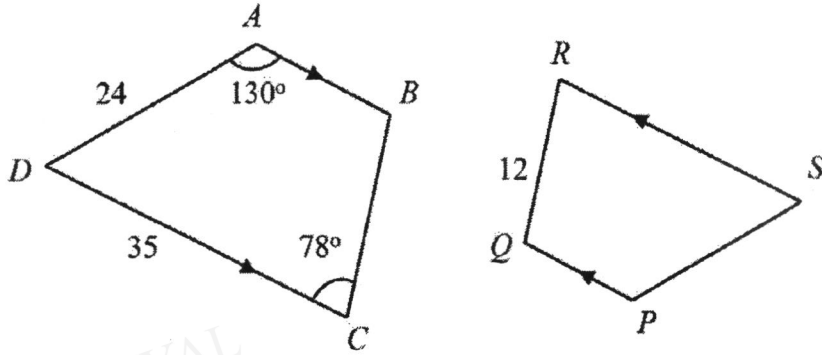
- (c) Which test is easier? Give a reason to justify your answer.

Answer (c) .....

.....

..... [2]

- 7 Trapezium  $ABCD$  is similar to the trapezium  $PQRS$ . It is given that  $AD = 24$  cm,  $CD = 35$  cm,  $RQ = 12$  cm,  $\angle DAB = 130^\circ$  and  $\angle BCD = 78^\circ$ .



Calculate  
 (c) the scale factor,

(d)  $PS$ ,

(e)  $\angle PQR$ .

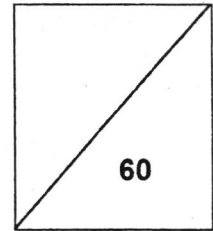
Answer (a) ..... [1]

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

Answer (c) .....<sup>o</sup> [2]



NORTH VISTA SECONDARY SCHOOL  
END-OF-YEAR EXAMINATION 2018



NAME: \_\_\_\_\_ (       ) CLASS: \_\_\_\_\_

SUBJECT: MATHEMATICS (PAPER 2)

DATE: 8 OCTOBER 2018

LEVEL/STREAM: SECONDARY 2 EXPRESS

TIME: 1 HOUR 30 MINUTES

**READ THESE INSTRUCTIONS FIRST**

Write your register 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.

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.

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For  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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.

<i>For Examiner's Use</i>	
Category	Question No.
Accuracy	
Brackets	
Fractions	
Units	
Others	
<b>Marks Deducted</b>	



Answer **all** the questions.

- 1 The stem-and-leaf diagram shows the distance Edward run to prepare for his physical fitness test.

0	2 2 2 5 6 6 6 8
1	0 0 2 2 2
2	0 0 0 0 5

2 | 5 represents 25 km

Calculate

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

DANYAL [1]  
 EDUCATION [1]  
 [1]

DANYAL  
 EDUCATION

- 2 The displacement,  $s$  metres of a car is directly proportional to the square of its velocity,  $v$  metres per second. The car with velocity 26 m/s has a displacement of 3380 m.

- (a) Express  $s$  in terms of  $v$ . [2]  
 (b) Calculate the displacement of the car with a velocity of 12 m/s. [1]

DANYAL [2]  
 EDUCATION [1]

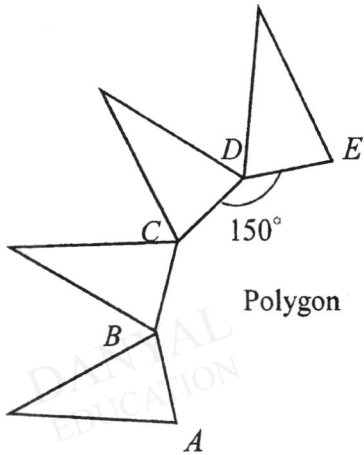
- 3 If  $y = \frac{x+1}{x-1}$ , express  $x$  in terms of  $y$ . [3]

- 4 The table shows information about a group of students in a class.

	Boys	Girls
Wear spectacles	2	5
Do not wear spectacles	21	12

- (i) A member of the group is selected at random.  
Find the probability that the student
- (a) is a boy, [1]  
(b) does not wear spectacles. [1]
- (ii) Calculate the number of students to be removed so that the probability of drawing a girl who wear spectacles from the remaining students in the class is  $\frac{1}{36}$ . [2]

- 5 The diagram shows a part of a polygon shaped bracelet made up of identical triangles.  $\angle CDE = 150^\circ$ .



- (a) Calculate the
- (i) number of triangles used to make a bracelet, [2]
  - (ii) sum of interior angles of the polygon formed by the bracelet. [1]
- (b) Calculate  $\angle ADE$ . [2]

6 Simplify the following algebraic fractions.

(a)  $\frac{b}{7c^2} \times \frac{2}{bc} \div \frac{1}{c^2}$ , [2]

(b)  $\frac{4x^2 - y^2}{2x + y} \times \frac{5}{x^2 - 6x - 7}$  [3]

DANYAL  
EDUCATION

DANYAL  
EDUCATION

DANYAL  
EDUCATION

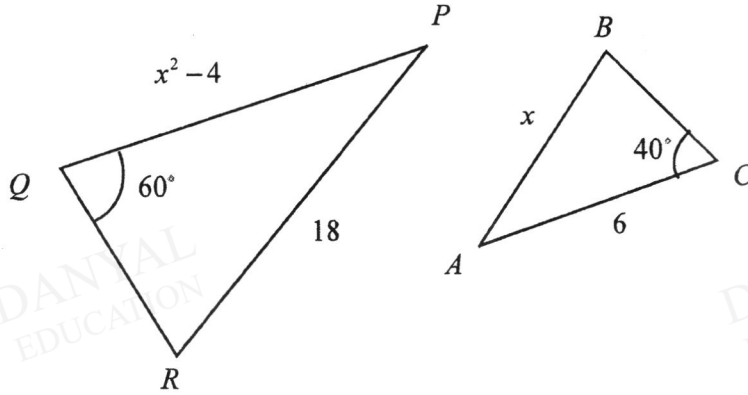
DANYAL  
EDUCATION

DANYAL  
EDUCATION

7 In the diagram  $\triangle PQR$  is similar to  $\triangle ABC$ .

It is given that  $PR = 12$  cm,  $PQ = (x^2 - 4)$  cm,  $AB = x$  cm and  $AC = 6$  cm.

$\angle PQR = 60^\circ$  and  $\angle ACB = 40^\circ$ .

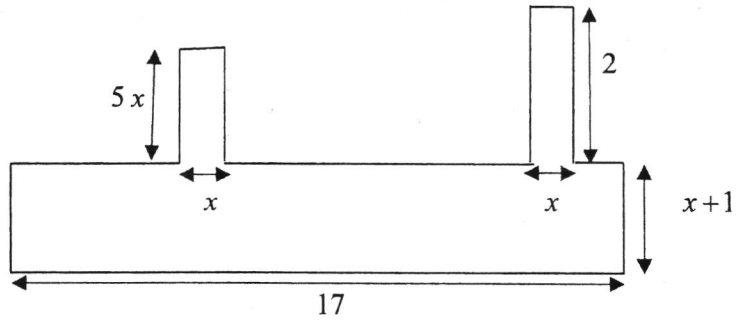


- (a) Calculate the value of  $x$ .  
 (b) Calculate reflex  $\angle BAC$ .

[3]

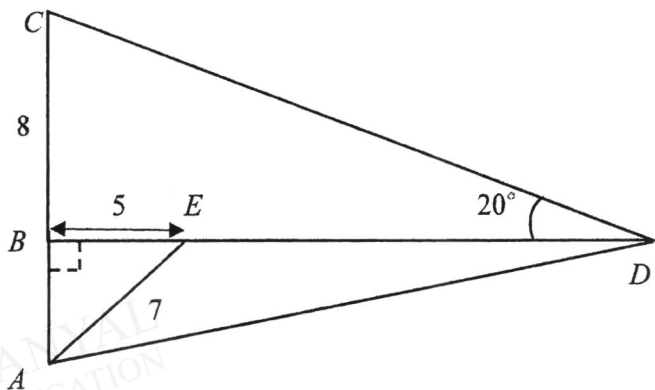
[2]

- 8 The diagram shows the shape of a children playground with an area of  $21 \text{ m}^2$ .



- (a) By considering the area, show that  $5x^2 + 19x - 4 = 0$ . [3]  
 (b) Hence, solve  $5x^2 + 19x - 4 = 0$  [2]  
 (c) Calculate the perimeter of the playground. [1]

- 9 The diagram shows a frame that is used to support a hanging weight.  $ABC$  is a vertical beam and  $BED$  is a horizontal beam.  $AD$ ,  $AE$  and  $CD$  are three supporting struts.



Given that  $BE = 5$  m,  $BC = 8$  m,  $AE = 7$  m and  $\angle BDC = 20^\circ$ , calculate

- |                          |     |
|--------------------------|-----|
| (a) the length of $AB$ , | [1] |
| (b) the length of $CD$ , | [2] |
| (c) the length of $ED$ , | [2] |
| (d) $\angle BDA$ .       | [2] |

- 10** A car park can accommodate cars and buses. On a particular day there were  $x$  buses and  $y$  cars in the car park, giving a total of 500 vehicles. The parking area for a bus is  $50 \text{ m}^2$  and the parking area for a car is  $10 \text{ m}^2$ . On that day a total area of  $8000 \text{ m}^2$  was occupied by buses and cars.

- (i) Write down a pair of simultaneous equations to represent the above information. [2]
- (ii) Solve your simultaneous equations to find the value of  $x$  and of  $y$ . [3]

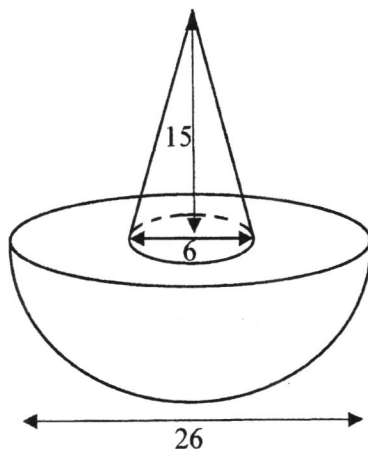
There is a flat rate charge per day for parking.

The flat rate for buses is 2 times that for cars. On that day, an income of \$2300 was earned by the company.

- (iii) Calculate the flat rate of the car. [1]



- 11 A manufacturer decides to produce solid ornament of mass 3500g floating in a container filled with liquid. The ornament is made up of a cone and a hemisphere. The diameter of the cone and the hemisphere are 6 cm and 26 cm respectively. The height of the cone is 15 cm.



- (a) Calculate the surface area of the ornament. [3]
- (b) The table shows the density of three liquids.

	Liquid A	Liquid B	Liquid C
Density ( $\text{g/cm}^3$ )	0.6	0.7	0.8

Determine which liquid the manufacturer will use to fill the container. Justify your decision with calculations. [4]

[Curved surface area of cone =  $\pi r l$ , Surface area of sphere =  $4\pi r^2$ ]

[Volume of cone =  $\frac{1}{3}\pi r^2 h$ , Volume of sphere =  $\frac{4}{3}\pi r^3$ ]

**Answer the whole of question 11 on this page.**

DANYAL  
EDUCATION

DANYAL  
EDUCATION

DANYAL  
EDUCATION

DANYAL  
EDUCATION

DANYAL  
EDUCATION

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

A model rocket is launched straight upward. The solid fuel propellant pushes the rocket off the ground.

The height  $y$  metres of the rocket above ground level at time  $x$  seconds is given by  $y = -4x^2 + 50x$  for  $0 \leq x \leq 8$ . The following table shows some corresponding values of  $x$  and  $y$ .

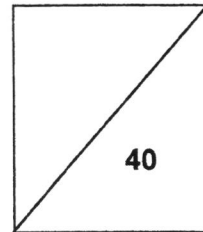
$x$	0	2	4	6	8	10	12	12.5
$y$	0	84	$a$	156	144	100	24	0

- (a) Calculate the value of  $a$ . [1]
- (b) Using 2 cm to represent 2 seconds, draw a horizontal  $x$ -axis for  $0 \leq x \leq 14$ .  
Using 2 cm to represent 20 m, draw a vertical  $y$ -axis.  
On your axes, plot the points given in the table and join them with a smooth curve. [3]
- (c) Using your graph,  
(i) find the values of  $x$  when the rocket is 80 m from the ground, [1]  
(ii) write down the equation of the line of symmetry of the graph. [1]
- (d) From the graph, find the maximum height reached by the rocket. [1]



# NORTH VISTA SECONDARY SCHOOL

## END-OF-YEAR EXAMINATIONS 2018 Answer Scheme



NAME: \_\_\_\_\_ (       ) CLASS: \_\_\_\_\_

SUBJECT: MATHEMATICS (PAPER 1)

DATE: \_\_\_\_\_

LEVEL/STREAM: SECONDARY 2 EXPRESS

TIME: 1 HOUR

### READ THESE INSTRUCTIONS FIRST

Write your register 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.

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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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 40.

For Examiner's Use	
Category	Question No.
Accuracy	
Brackets	
Fractions	
Units	
Others	
<b>Marks Deducted</b>	

Answer **all** the questions.

1 Simplify

(a)  $-4(2x-5)+2-(x-1)$ ,

$$\begin{aligned} & -4(2x-5)+2-(x-1) \\ & = -8x+20+2-x+1 \\ & = -9x+23 \quad \text{----- B1} \end{aligned}$$

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

(b)  $(2x+1)^2-(x-3)^2$ .

$$\begin{aligned} & (2x+1)^2-(x-3)^2 \\ & = (2x+1+x-3)(2x+1-x+3) \\ & = (3x-2)(x+4) \quad \text{---- M1 (simplify)} \\ & = 3x^2+12x-2x-8 \\ & = 3x^2+10x-8 \quad \text{---- A1} \end{aligned}$$

$$\begin{aligned} & (2x+1)^2-(x-3)^2 \\ & = 4x^2+4x+1-(x^2-6x+9) \\ & = 4x^2+4x+1-x^2+6x-9 \quad \text{---- M1 (correct expansion)} \\ & = 3x^2+10x-8 \quad \text{---- A1} \end{aligned}$$

Answer (b) ..... [2]

2 It is given that  $a+b=5$  and  $ab=-3$ .  
Find the value of  $a^2+b^2$ .

$$\begin{aligned} a^2+b^2 &= (a+b)^2-2ab \\ &= 5^2-2(-3) \quad \text{---- M1 (correct substitution)} \\ &= 31 \quad \text{---- A1} \end{aligned}$$

Answer ..... [2]

- 3 Write as a single fraction in its simplest form  $\frac{2x}{(2x-3)^2} - \frac{1}{2x-3}$ .

$$\frac{2x}{(2x-3)^2} - \frac{1}{2x-3} = \frac{2x-(2x-3)}{(2x-3)^2} \quad \text{or} \quad \frac{2x-2x+3}{(2x-3)^2} \quad \text{--- M1}$$

$$= \frac{3}{(2x-3)^2} \quad \text{--- A1}$$

Answer ..... [2]

- 4 Factorise the following

(a)  $\frac{x}{2} - 3xy + x^2$ ,

$$\frac{x}{2} - 3xy + x^2$$

$$= x \left( \frac{1}{2} - 3y + x \right) \quad \text{or} \quad \frac{1}{2} x(1-6y+2x)$$

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

(b)  $2p(1-4q) - (4q-1)$ .

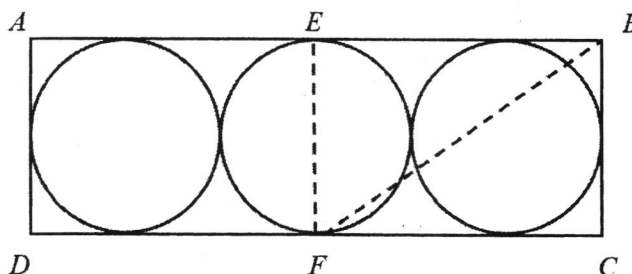
$$2p(1-4q) - (4q-1)$$

$$= 2p(1-4q) + (1-4q) \quad \text{--- M1 (change sign)}$$

$$= (1-4q)(2p+1) \quad \text{--- A1}$$

Answer (b) ..... [2]

- 5 The diagram below shows three identical circles fitted inside a rectangle. The diameter of each circle is 10 cm. Line  $EF$  passes through the centre of the circle.



Find the length of line  $BF$ .

By Pythagoras Theorem,

$$BF = \sqrt{15^2 + 10^2} \quad \text{--- M1 (length 15 cm)}$$

$$= 18.0277$$

$$= 18.0 \text{ cm} \quad \text{--- A1}$$

Answer

..... cm [2]

- 6 It is given that  $V = \frac{1}{3}\pi r^2 h$ .

- (a) Find the value of  $V$  when  $r = \frac{22}{9}$  and  $h = 21$ .

$$V = 1782$$

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

- (b) Express  $r$  in terms of  $V$ ,  $\pi$  and  $h$ .

$$V = \frac{1}{3}\pi r^2 h$$

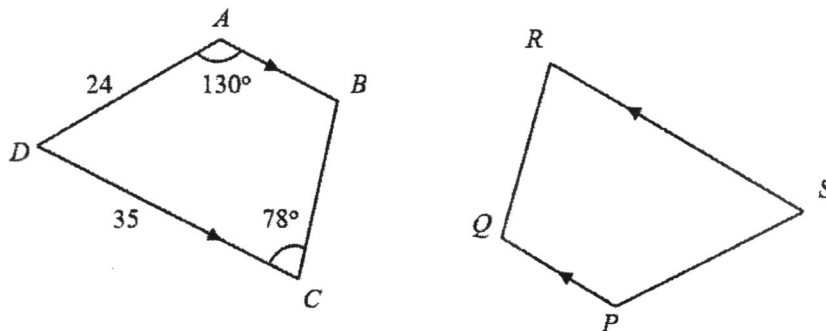
$$\pi r^2 h = 3V$$

$$r^2 = \frac{3V}{\pi h} \quad \text{--- M1 (make } r^2 \text{ the subject)}$$

$$r = \pm \sqrt{\frac{3V}{\pi h}} \quad \text{--- A1}$$

Answer (b) ..... [2]

- 7 Trapezium  $ABCD$  is congruent to the trapezium  $PQRS$ . It is given that  $AD = 24$  cm,  $CD = 35$  cm,  $\angle DAB = 130^\circ$  and  $\angle BCD = 78^\circ$ .



Find

- (a)  $PS$ ,

$PS = 24$  cm

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

- (b)  $\angle PQR$ .

$\angle QRS = 78^\circ$   
 $PQR = 180^\circ - 78^\circ$   
 $= 102^\circ$

Answer (b) .....  $^\circ$  [1]

- 8 Solve the simultaneous equations.

$2x - y = 12$   
 $4x + 5y = -9$

$2x - 3y = 12$  --- (1)

$4x - 6y = 24$  --- (2)

$4x + 5y = -9$  --- (3)

(2) - (3):

$4x - 6y - (4x + 5y) = 24 - (-9)$  --- M1 (substitution or elimination)

$4x - 6y - 4x - 5y = 33$

$-11y = 33$

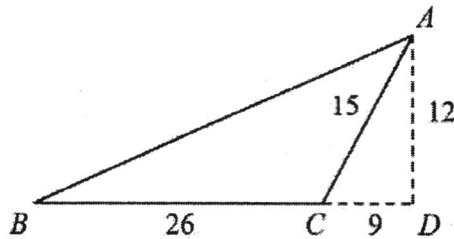
$y = -3$  --- A1

$x = 1.5$  --- A1

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



- 9 It is given that  $AC = 15$  cm,  $AD = 12$  cm,  $BC = 26$  cm and  $CD = 9$  cm.

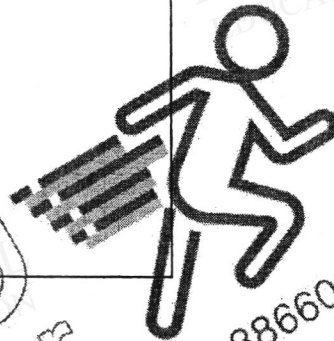


- (a) Expressing as a fraction in its lowest form, find  
 (i)  $\tan \angle ACD$ ,  
 (ii)  $\sin \angle BAD$ .

$$(a)(i) \tan \angle ACD = \frac{4}{3} \quad \text{---- B1}$$

$$(a)(ii) AB = \sqrt{35^2 + 12^2} = 37 \quad \text{---- M1}$$

$$\sin \angle BAD = \frac{35}{37} \quad \text{---- A1}$$



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

(ii) ..... [2]

- (b) Find the shortest distance from C to AB.

$$\begin{aligned} \text{Area of } ABC &= \frac{1}{2}(26)(12) \\ &= 156 \quad \text{---- M1 (area of } ABC) \end{aligned}$$

Let  $h$  be the shortest distance from C to AB

$$\frac{1}{2}(37)h = 156$$

$$h = 8\frac{16}{37} \quad \text{---- A1}$$

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

10 A map of Singapore has a scale of 1: 250 000.

- (a) The length of the Singapore river on the map is 1.2 cm.  
Calculate the actual length, in kilometres, of the Singapore river.

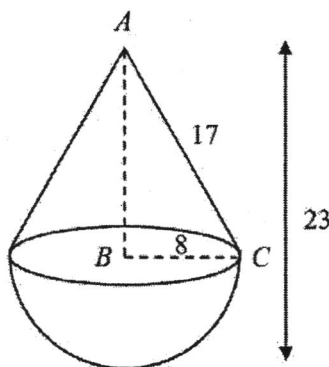
$1 : 250\,000$ $1\text{ cm} : 2.5\text{ km}$  $\text{Actual length} = 1.2 \times 2.5 \text{ --- M1}$ $= 3\text{ km} \text{ --- A1}$
---

- (b) The area of Sentosa is  $4.71\text{ km}^2$ .  
Calculate, the area, in square centimetres, of Sentosa on the map.

$1 : 250\,000$ $1\text{ cm} : 2.5\text{ km}$ $1\text{ cm}^2 : 6.25\text{ km}^2 \text{ --- M1 (area scale)}$  $\text{Area on the map} = \frac{4.71}{6.25}$ $= 0.7536\text{ cm}^2 \text{ --- A1}$
--

Answer (b) .....  $\text{cm}^2$  [2]

- 11 The solid shown below consists of a solid cone attached to a solid hemisphere. The base radius of the cone is 8 cm and the height of the solid is 23 cm.



- (a) Given that the slant height of the cone is 17 cm, explain why  $\angle ABC = 90^\circ$ .

Answer

$$AB = 15 \text{ cm}$$

$$AB^2 + BC^2 = 15^2 + 8^2$$

$$= 289$$

$$AC^2 = 17^2$$

$$= 289$$

Since  $AB^2 + BC^2 = AC^2$ , by the converse of Pythagoras Theorem,  $\angle ABC = 90^\circ$  ----- A1

- (b) Calculate  
(i) the total surface area of the solid

Total surface area

$$= \pi(8)(17) + 2\pi(8^2)$$

$$= 136\pi + 128\pi$$

$$= 829.38$$

$$= 829 \text{ cm}^2 \text{ (3 s.f.)} \text{ ---- A1}$$

Answer (b)(i) .....  $\text{cm}^2$  [2]

- (ii) the volume of the solid.

Volume of solid

$$= \frac{1}{3}\pi(8^2)(15) + \frac{2}{3}\pi(8^3) \text{ ---- M1}$$

$$= 661\frac{1}{3}\pi$$

$$= 2077.6399 = 2080 \text{ cm}^3 \text{ (3 s.f.)} \text{ --- A1}$$

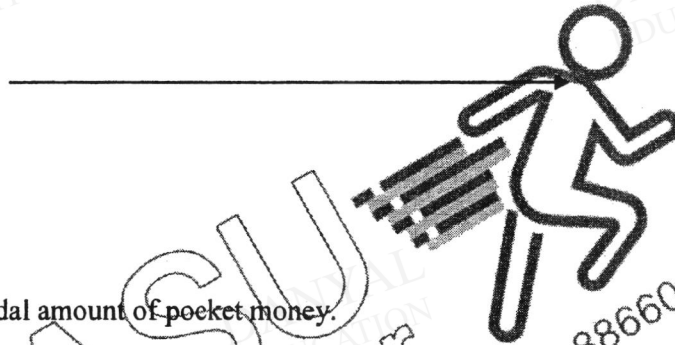
Answer (b)(ii) .....  $\text{cm}^3$  [2]

12 The table shows the pocket money of 20 students, rounded off to the nearest whole number.

23	24	23	25	20
21	20	24	22	21
23	25	25	20	23
23	20	21	22	25

(a) Draw a dot diagram to represent the information in the table.

*Answer*



(a) Find the modal amount of pocket money.

Mode = \$20

*Answer* (b) \$ ..... [1]

(b) Explain two limitations of using a dot diagram.

*Answer* It is difficult to represent decimals in a dot diagram.  
The presence of extreme values might make the dot diagram difficult to read.  
We cannot represent a large sample size on a dot diagram.  
Need to round off answers. [2]

(c) Is a line chart a suitable way to represent the data? Explain your answer.

*Answer* No. A line graph is suitable for time-based data. [1]

**Question that are similar to P2 and thus removed:**

- 11 The following stem-and-leaf diagram shows the English and Mathematics scores of a class of 20 students.

Leaves for English scores	Stem	Leaves for Mathematics scores
	3	8
0 3 5	4	9 5 3
2 3 4 4 6	5	9 7 5 4 4 4 3
5 6 7 7 8 9	6	8 7 6 4 3 0
3 4 5 6 9	7	5 4 1
0	8	

Key: 5 | 0 means 50 marks

- (a) Find the modal score in the Mathematics test.



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

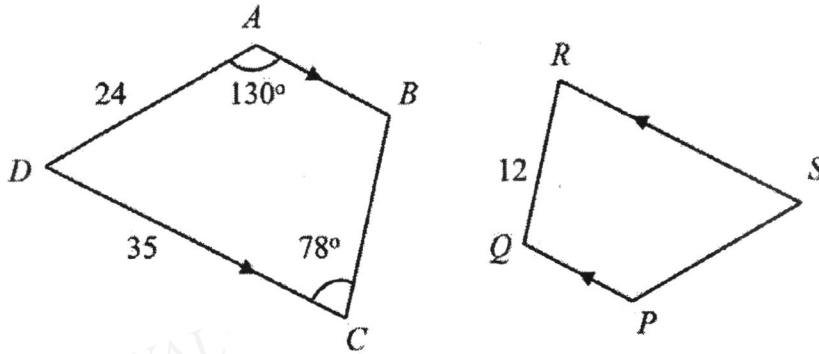
- (b) Find the ratio of students who scored more than 50 marks in the English test to those in the Mathematics test.

Answer (b) ..... : ..... [2]

- (c) Which test is easier? Give a reason to justify your answer.

Answer (c) .....  
 .....  
 ..... [2]

- 7 Trapezium  $ABCD$  is similar to the trapezium  $PQRS$ . It is given that  $AD = 24$  cm,  $CD = 35$  cm,  $RQ = 12$  cm,  $\angle DAB = 130^\circ$  and  $\angle BCD = 78^\circ$ .



Calculate

- (c) the scale factor,

- (d)  $PS$ ,

- (e)  $\angle PQR$ .

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

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

Answer (c) .....<sup>o</sup> [2]



Marking Scheme

1(i)	$\frac{198}{18}$ $= 11$	B1
(ii)	10	B1
(iii)	20	B1
2(a)	$s = kv^2$ where k is a constant $3380 = k(26)^2$ $k = 5$ $s = 5v^2$	M1 A1
(b)	$s = 5v^2$ $= 5 \times 12^2$ $= 720 \text{ m}$	B1
3	$y = \frac{x+1}{x-1}$ $y(x-1) = x+1$ $xy - y = x+1$ $xy - x = 1+y$ $x(y-1) = 1+y$ $x = \frac{1+y}{y-1}$	M1 (cross multiply) M1 (factorise) A1
4(i)(a)	$\frac{23}{40}$	B1
(i)(b)	$\frac{33}{40}$	B1
(ii)	$\frac{5-x}{40-x} = \frac{1}{30}$ $180 - 36x = 40 - x$ $-35x = -140$ $x = 4$	M1 (equate) A1
5(a)(i)	$ext \angle = 30^\circ$ number of triangles $= \frac{360}{30}$ $= 12$	M1 A1
(ii)	$sum = 10 \times 180^\circ$ $= 1800^\circ$	B1

(b)	$\angle ADE = 150^\circ - \frac{360^\circ - 150^\circ - 150^\circ}{2}$ $= 120^\circ$	M1 A1
6(a)	$\frac{b}{7c^2} \times \frac{2}{bc} \div \frac{1}{c^2}$ $= \frac{b}{7c^2} \times \frac{2}{bc} \times c^2$ $= \frac{2}{7c}$	M1 for flip A1
(b)	$\frac{4x^2 - y^2}{2x + y} \times \frac{5}{x^2 - 6x - 7}$ $= \frac{(2x + y)(2x - y)}{2x + y} \times \frac{5}{(x + 1)(x - 7)}$ $= \frac{5(2x - y)}{(x + 1)(x - 7)}$	M1 for (2x + y)(2x - y) M1 for (x + 1)(x - 7) A1
7(a)	$\frac{x^2 - 4}{x} = \frac{18}{6}$ $x^2 - 4 = 3x$ $x^2 - 3x - 4 = 0$ $(x + 1)(x - 4) = 0$ $x = -1 \text{ or } x = 4$ <p>(rejected)</p>	M1 M1(Form equ) A1 (no marks if do not reject)
(b)	$\angle BAC$ $= 180^\circ - 60^\circ - 40^\circ (\angle \text{ sum of } \Delta)$ $= 80^\circ$ $\text{reflex } \angle BAC$ $= 360^\circ - 80^\circ ((\angle s \text{ at a point}))$ $= 280^\circ$	M1 A1
8(a)	$5x^2 + 17(x + 1) + 2x = 21$ $5x^2 + 17x + 17 + 2x - 21 = 0$ $5x^2 + 19x - 4 = 0$	M1 M1



(b)	$5x^2 + 19x - 4 = 0$ $(5x - 1)(x + 4) = 0$ $5x - 1 = 0$ or $x + 4 = 0$ $x = \frac{1}{5}$ or $x = -4$	M1  A1
(c)	40.8	B1
9(a)	$AB$ $= \sqrt{7^2 - 5^2}$ $= 4.90$ m	B1
(b)	$\sin 20^\circ = \frac{8}{CD}$ $CD = 23.4$ m	M1 A1
(c)	$\tan 20^\circ = \frac{8}{BD}$ $BD = 21.979$ m $ED = 21.979 - 5 = 17.0$ m	M1 A1
(d)	$\tan \angle BDA = \frac{4.8989}{21.979}$ $\angle BDA = 12.6^\circ$	M1 A1
10(i)	$x + y = 500$ $50x + 10y = 8000$	M1 B1
(ii)	$x + y = 500$ --- (1) $50x + 10y = 8000$ --- (2) From (1), $y = 500 - x$ --- (3) Sub (3) into (2), $50x + 10(500 - x) = 8000$ $50x + 5000 - 10x = 8000$ $40x = 3000$ $x = 75$ Sub $x = 75$ into (1) $y = 425$	ecf if from incorrect equation  M1 ecf M1 ecf  A1
(iii)	$\frac{2300}{75 \times 2 + 425} = \$4$	B1

11(a)	$l^2 = 15^2 + 3^2$ $l^2 = 234$ $l = \sqrt{234}$ $= 15.297$ $= 15.3$ Surface area $= \pi(3)(15.297) + [\pi(13)^2 - \pi(3)^2] + 2\pi(13)^2$ $= 543.891\pi$ $= 1710 \text{ cm}^2$	M1 for slant height  M1 for big circle – small circle A1
(b)	Volume $= \frac{1}{3}\pi(3)^2(15) + \frac{2}{3}\pi(13)^3$ $= 1509\frac{2}{3}\pi$ $= 4742.7 \text{ cm}^3$ Density of ornament $= \frac{3500}{4742.7}$ $= 0.738 \text{ g/cm}^3$ Since density of ornament is less than density of liquid C, the ornament floats. Thus, the manufacturer will choose liquid C.	M1 for sub values  M1 for volume M1 for density  A1
12(a)	136 m	B1
(b)	Correct points Smooth curve	C2 B1
(c)(i)	1.6 to 1.8, 10.4 to 10.8	B1
(ii)	$x = 6.25$ (accept from 6.05 to 6.45)	B1
(d)	158 m (accept from 157.8 to 158.2)	B1

Q12

$$(a) a = -4(4)^2 + 50(4) \\ = 136 \quad 81$$

$$(c)(i) x = 1.8, 10.6$$

$$(ii) x = 6.25 \quad (6.05 < x < 6.45)$$

$$(d) \text{Max height} = 138 \text{ m} \quad (157.8 < h < 158.2)$$

