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Answer **all** the questions

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- 1 John takes 9 minutes to cycle through a tunnel that is 2700 metres long.  
Find his speed in kilometres per hour.

Answer .....km/h [2]

- 2 The usual price of an item is \$35. It was sold for \$25.  
Jack says that the percentage decrease is 40  
Do you agree with him? Show your working.

Answer

I ..... (agree/disagree) with Jack. [2]

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Use

- 3 Alan, Ben and Charles ran for the post of President of Students' Council. Alan won 44% of the votes. Ben won 38% of the votes. Charles won 36 votes.

Find the total number of votes cast.

Answer ..... [2]

- 4 By writing each value correct to 1 significant figure, estimate the value of

$$\left( \frac{49.3}{2.39 \times 95.3} \right)^{\frac{1}{2}}.$$
 Show your working.

Answer ..... [2]

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- 5 The probability that Jolene arrives at school before and after the reporting time of 0730 is  $\frac{4}{5}$  and  $\frac{1}{20}$  respectively.

- (a) Find the probability that Jolene will arrive at school at exactly 0730.

Answer ..... [1]

- (b) Over a period of 100 days, estimate the number of days that Jolene will be late for school.

Answer ..... [1]

- 6 (a) Solve  $\frac{7}{x+2} = 3$

Answer  $x =$  ..... [1]

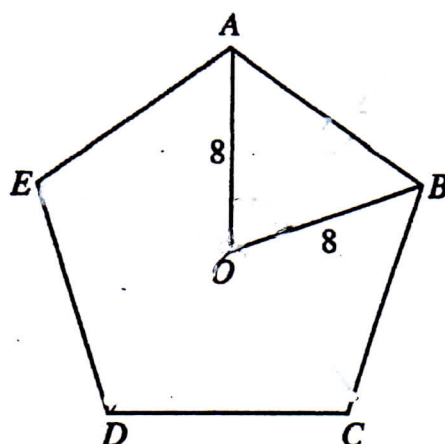
- (b) Solve the inequality  $-2x \leq 15 + 3x$ .

Answer ..... [2]



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7



$ABCDE$  is a regular pentagon with centre  $O$ .  $OA = OB = 8$  cm.  
Calculate the area of the pentagon.

Answer .....cm<sup>2</sup> [3]

8

1  $\sqrt{3}$  2 5 8  $\frac{22}{7}$   $\pi$  41

List down all

(a) irrational numbers,

Answer ..... [1]

(b) prime numbers,

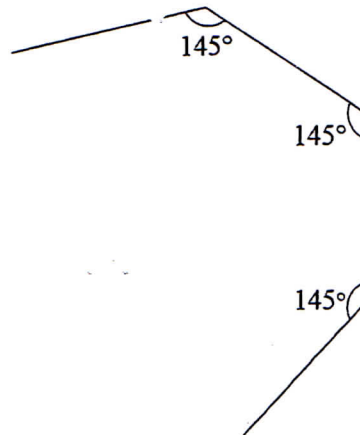
Answer ..... [1]

(c) perfect cubes.

Answer ..... [1]

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9



James says that the figure is part of a regular polygon. Is he correct? Show your working.

Answer: James is .....

[3]

- 10 James received \$55 766 at the end of 6 years of investing in a financial instrument that earns 1.5% per year compound interest.

Calculate the interest James earned at the end of the 6 years. Give your answer to the nearest dollar.

Answer \$ ..... [3]

For  
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- 11 Two LED lights flash at different intervals.  
The lights first flash together at 09 00.  
They next flash together at 09 14.

- (a) The first LED light flashes once every 60 seconds.  
Express 60 as a product of its prime factors. Give your answer  
in index notation.

Answer  $60 = \dots\dots\dots$  [1]

- (b) Find, in seconds, the smallest possible interval that the second light  
flashes at.

Answer  $\dots\dots\dots$  s [2]

- 12 Solve these simultaneous equations.

$$5x - 2y = 21$$

$$y + 8 = 2x$$

Answer  $x = \dots\dots\dots$

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

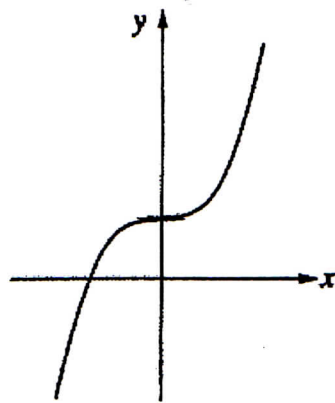
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13

|               |               |               |                |
|---------------|---------------|---------------|----------------|
| $y = x^3 + 5$ | $y = 5 - x^3$ | $y = 5 + x$   | $y = 5 - x$    |
| $y = x - 5$   | $y = x^2 + 5$ | $y = 5 - x^2$ | $y = -5 - x^2$ |

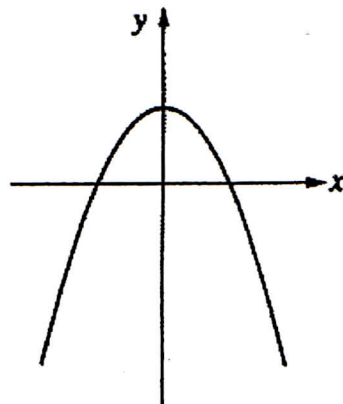
Write down a possible equation for each of the sketch graphs below.

(a)



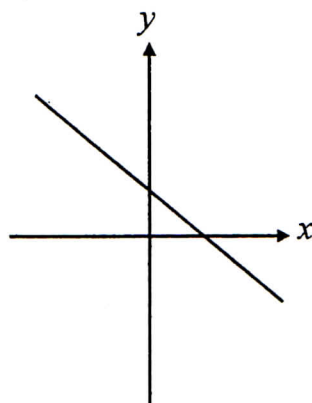
Answer ..... [1]

(b)



Answer ..... [1]

(c)



Answer ..... [1]

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- 14 (a) A class of 20 students were asked how many minutes they had taken to complete an assignment.  
The results are shown in the stem-and-leaf diagram.

|   |  |                     |
|---|--|---------------------|
| 2 |  | 4 5 5 7 7 7 8 8 9 3 |
| 3 |  | 1 2 2 2 3 7         |
| 4 |  | 4 6 7 8             |
| 5 |  |                     |
| 6 |  | 9                   |

Key: 3 | 2 means 32 minutes

- (i) Write down the modal time taken.

Answer .....minutes [1]

- (ii) Find the median time taken.

Answer .....minutes [1]

- (iii) Explain why the mean may not be an appropriate average to use to summarize the time taken by these students.

Answer .....

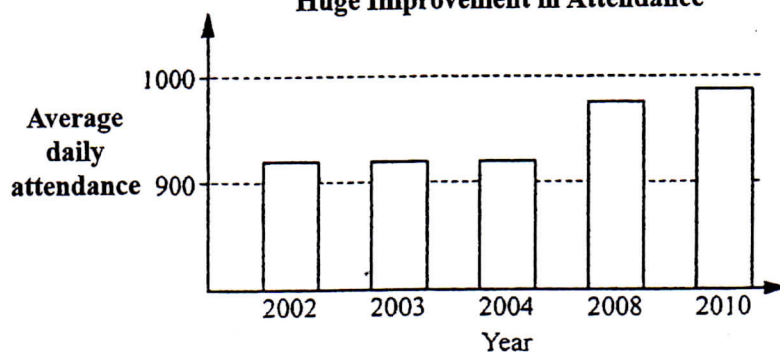
.....

.....

..... [1]

(b)

Huge Improvement in Attendance



The chart claims that there is a huge improvement in attendance over the years. Do you agree? Give your reason.

Answer .....

.....

.....

..... [1]

For  
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- 15 The point  $A$  has coordinates  $(a, 8)$ .  
The point  $B$  has a  $y$ -coordinate 4 more than that of  $A$  and a  $x$ -coordinate 3 less than that of  $A$ .

- (a) Write down the gradient of the line  $AB$ .

Answer ..... [1]

- (b) Calculate the length of  $AB$ .

Answer .....units [1]

- (c) Point  $C$  lies on the line  $AB$  and has coordinate  $(-3, 6)$ .  
Find the equation of the line  $AB$ .

Answer ..... [2]

- 16 In a sequence, the same number is subtracted each time to obtain the next term. The first four terms of the sequence are

$$26 \quad a \quad b \quad 5$$

- (a) Find the values of  $a$  and  $b$ .

Answer  $a = \dots\dots\dots$ ,  $b = \dots\dots\dots$  [1]

- (b) Find an expression for the  $n^{\text{th}}$  term of this sequence.

Answer ..... [1]

- (c) Explain why  $-237$  is not a term of this sequence.

Answer .....  
.....  
..... [2]



For  
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- 17 (a) Tap A takes 3 minutes to fill a tank with water.  
 Tap B takes 4 minutes to fill the same tank with water.  
 If both taps are turned on at the same time, how long will it  
 take for the tank to be filled?

Answer .....minutes [2]

- (b)  $w$  is inversely proportional to  $x^2$ .  
 When  $x$  has a certain value,  $w = 5$ .  
 Find the value of  $w$  when  $x$  is doubled.

Answer  $w =$  ..... [2]

- 18 (a) Given that  $9^5 \div 3^x = 27^{\frac{2}{3}}$ , find  $x$ .

Answer  $x =$  ..... [3]

- (b) Simplify  $(2ab)^2 \div 3a^{-2}b^3 \times (8ac)^0$ . Express your answer in  
 positive index.

Answer ..... [2]

For  
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19 A rhombus  $ABCD$  has sides 6 cm. Angle  $ABC$  is  $50^\circ$ .

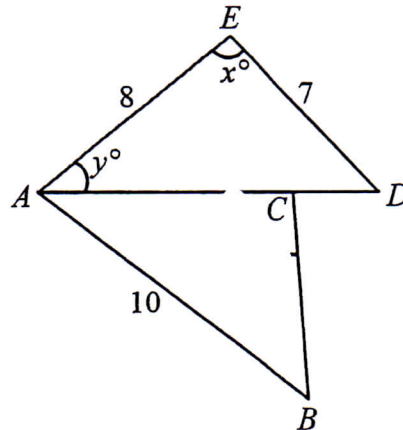
- (a) Construct the rhombus and label its vertices  $ABCD$ . [2]
- (b) Construct the perpendicular bisector of  $BC$ . [1]
- (c) Construct the bisector of angle  $BAD$ . [1]
- (d) Label the point  $P$  such that  $BP$  is equal to  $PD$  and is equidistant from  $B$  and  $C$ . [1]

Answer (a), (b), (c) and (d)



For  
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- 20 (a) Triangles  $ABC$  and  $DAE$  are congruent.  
 $AE = 8$  cm,  $ED = 7$  cm and  $AB = 10$  cm.  
 Angle  $AED = x^\circ$  and angle  $DAE = y^\circ$ .



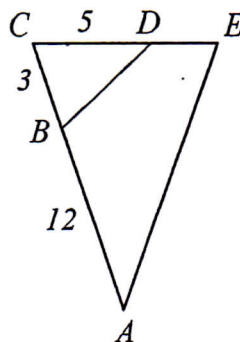
- (i) Express in terms of  $x^\circ$  and/or  $y^\circ$ , the angle  $ACB$ .

Answer ..... $^\circ$  [1]

- (ii) Find the length  $CD$ .

Answer .....cm [1]

- (b) The two triangles in the diagram are similar.



- (i) Write down the pair of similar triangles.

Answer

Triangle ..... is similar to triangle ..... [1]

- (ii) Calculate the length  $DE$ .

Answer .....cm [2]

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- 21 (a) Factorise completely  $3ap - 4bp + 12bq - 9aq$ .

Answer ..... [2]

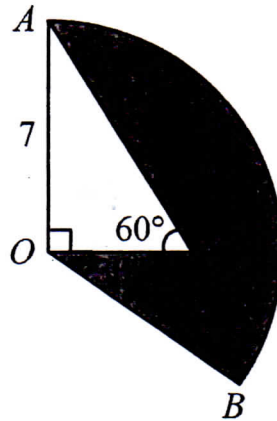
- (b) Given that  $4x^2 - 9y^2 = 1$  and  $4x - 6y = 5$ , find the value of  $2x + 3y$ .

Answer ..... [3]

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Examiner's  
UseFor  
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Use

- 22  $AOB$  is a sector of a circle, centre  $O$ , of radius 7 cm.  
 $AOC$  is a right-angled triangle. Angle  $ACO = 60^\circ$  and angle  $COB = 30^\circ$ .

Find the area of the shaded region.



Answer .....cm<sup>2</sup> [5]

For  
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UseFor  
Examiner's  
Use

- 23 Mr Tan is married with 2 children. He earned a gross annual income of \$76 200. Of this, the amount that will **not** be subjected to income tax is:

|                  |                  |
|------------------|------------------|
| Personal relief  | \$3000           |
| Wife relief      | \$2000           |
| Child relief     | \$4000 per child |
| CPF contribution | \$19 200         |

- (a) Calculate Mr Tan's chargeable income.

Answer \$..... [2]

The income tax rates are shown below:

| Chargeable Income | Income Tax Rate (%) | Gross Tax Payable (\$) |
|-------------------|---------------------|------------------------|
| First \$20,000    | 0                   | 0                      |
| Next \$10,000     | 2                   | 200                    |
| First \$30,000    | -                   | 200                    |
| Next \$10,000     | 3.50                | 350                    |
| First \$40,000    | -                   | 550                    |
| Next \$40,000     | 7                   | 2,800                  |

- (b) Calculate his income tax payable.

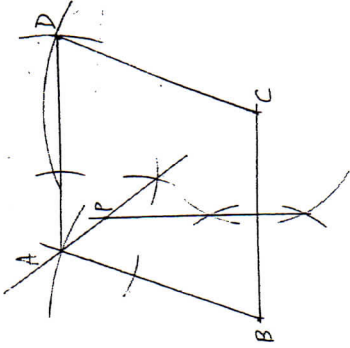
Answer \$..... [3]

End of Paper

| Qn | Steps/Answer                                                                                                                                                                                 | Remarks<br>O.E.      | Total |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------|
| 1  | Speed = $2700 \div 9 = 300$ m/min<br>= 18 km/h                                                                                                                                               |                      | [2]   |
| 2  | Percentage decrease = $\frac{35 - 25}{35} \times 100\% = 28.6\%$                                                                                                                             |                      | [2]   |
| 3  | Disagree<br>(100 - 44 - 38)% = 36<br>Total votes cast = $(100 \div 18) \times 36 = 200$                                                                                                      |                      | [2]   |
| 4  | $\left(\frac{50}{2 \times 100}\right)^2$<br>$= \frac{1}{2}$                                                                                                                                  |                      | [2]   |
| 5  | (a) $\frac{3}{20}$<br>(b) 5                                                                                                                                                                  |                      | [2]   |
| 6  | (a) $x = \frac{1}{3}$<br>(b) $-5x \leq 15$<br>$x \geq -3$                                                                                                                                    |                      | [3]   |
| 7  | (a) Angle AOB = $360 \div 5 = 72^\circ$<br>Area of AOB = $\frac{1}{2}(8)(8)\sin 72^\circ$<br>Area of pentagon = $\frac{1}{2}(8)(8)\sin 72^\circ \times 5 = 152$ cm <sup>2</sup>              |                      | [3]   |
| 8  | (a) $\sqrt{3}, \pi$<br>(b) 2, 5, 41<br>(c) 1, 8                                                                                                                                              |                      | [3]   |
| 9  | exterior angle = $180 - 145 = 35$<br>Number of sides = $360 \div 35 = 10.3$<br>James is wrong.                                                                                               |                      | [3]   |
| 10 | $55766 = P\left(1 + \frac{1.5}{100}\right)^6$<br>P = 51000<br>Interest earned = \$4766                                                                                                       |                      | [3]   |
| 11 | (a) $60 = 2 \times 2 \times 3 \times 5$<br>(b) $840 = 2 \times 2 \times 2 \times 3 \times 5 \times 7$<br>2 <sup>nd</sup> light flashes once every<br>$2 \times 2 \times 2 \times 7 = 56$ sec | 14 min = 840 seconds | [3]   |
| 12 | Either substitution or elimination method<br>$x = 5$<br>$y = 2$                                                                                                                              |                      | [3]   |
| 13 | (a) $y = x^3 + 5$<br>(b) $y = 5 - x^2$<br>(c) $y = 5 - x$                                                                                                                                    |                      | [3]   |

|    |                                                                                                                                                                                                                                                                                                                            |                                                                                                               |     |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-----|
| 14 | (a)(i) 27 and 32 min<br>(a)(ii) 31.5 min<br>(a)(iii) There is an outlier of 69 minutes which will cause the mean to be skewed or inaccurate. Disagree. The years 2005 to 2007 are not displayed and there might have been a drop in attendance during that period.<br>(b)                                                  |                                                                                                               | [4] |
| 15 | (a) $\frac{4}{-\frac{4}{3}}$<br>(b) 5<br>(c) $6 = -\frac{4}{3}(-3) + c$<br>$y = -\frac{4}{3}x + 2$                                                                                                                                                                                                                         | Rise/run                                                                                                      | [4] |
| 16 | (a) $a = 19, b = 12$<br>(b) $26 - 7(n - 1)$<br>(c) $26 - 7(n - 1) = -237$<br>$n = 38.6$<br>As $n$ is not an integer or whole number, -237 is not a term of this sequence.                                                                                                                                                  |                                                                                                               | [4] |
| 17 | (a) In 1 minute, they fill $\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$ of the tank together<br>They will take $\frac{12}{7} = 1.71$ minutes to fill the tank together.<br>(b) $5 = \frac{k}{x^2} \Rightarrow k = 5x^2$<br>When $x$ is doubled,<br>$w = \frac{k}{(2x)^2} = \frac{k}{4x^2} = \frac{5x^2}{4x^2} = \frac{5}{4}$ | Tap A fills $\frac{1}{3}$ of the tank in 1 minute while<br>Tap B fills $\frac{1}{4}$ of the tank in 1 minute. | [4] |
| 18 | (a) $3^{10} + 3^7 = 3^7$<br>$10 - x = 2$<br>$x = 8$<br>(b) $4a^2b^3 \div 3a^{-2}b^3 \times 1$<br>$= \frac{4a^4}{3b}$                                                                                                                                                                                                       |                                                                                                               | [5] |



|    |                                                                                                                                                                                                                                                                                                                                                                                   |     |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 19 | <p>                     B1 for correct length of sides 6 cm.<br/>                     B1 for construction lines and arcs.<br/>                     B1 for perpendicular bisector<br/>                     B1 for angle bisector<br/>                     B1 for point P.                 </p>  | [5] |
| 20 | <p>                     (a) <math>x^\circ</math><br/>                     (b) 3 cm<br/>                     (c) BCD, ECA<br/>                     (d) <math>15 = \frac{CE}{5 - 3}</math><br/> <math>CE = 9</math><br/> <math>DE = 9 - 5 = 4\text{ cm}</math> </p>                                                                                                                 | [5] |
| 21 | <p>                     (a) <math>p(3a - 4b) - 3q(3a - 4b)</math><br/> <math>= (p - 3q)(3a - 4b)</math><br/>                     (b) <math>(2x + 3y)(2x - 3y) = 5</math><br/> <math>4x - 6y = 5</math><br/> <math>2x - 3y = \frac{5}{2}</math><br/>                     Hence <math>2x + 3y = 5 + \frac{5}{2}</math><br/> <math>2x + 3y = 2</math> </p>                           | [5] |

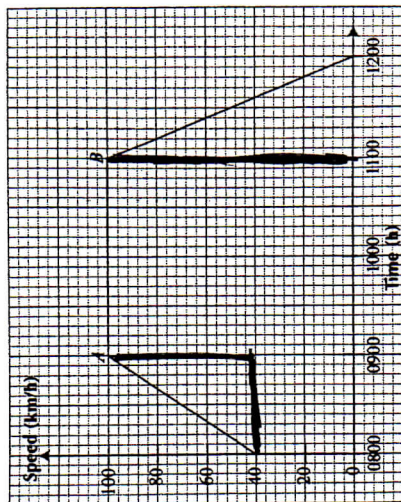
|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 22 | <p> <math>OC = \frac{7}{\tan 60^\circ}</math><br/>                     Area of AOC = <math>\frac{1}{2} (7) (\frac{7}{\tan 60^\circ})</math><br/>                     Area of sector AOB = <math>\frac{120^\circ}{360^\circ} (\pi) (7^2)</math><br/>                     Area of shaded region<br/> <math>= \frac{120^\circ}{360^\circ} (\pi) (7^2) - \frac{1}{2} (7) (\frac{7}{\tan 60^\circ})</math><br/> <math>= 37.2 \text{ cm}^2</math> </p> | [5] |
| 23 | <p>                     (a) Total reliefs = \$32 200<br/>                     Chargeable income = 76 200 - 32 200 = \$44 000<br/>                     Tax on first \$40 000 = \$550<br/>                     Tax on rest of income = <math>\frac{7}{100} \times 4000 = \\$280</math><br/>                     Total tax payable = 550 + 280 = \$830<br/>                     (b)                 </p>                                            | [5] |

# Section A (52 marks)

Answer all the questions in this section.

- 1 It is given that  $v^2 = u^2 - 2gh$ .  
(a) Evaluate  $v$  when  $u = 30$ ,  $g = 9.8$  and  $h = 24.1$ . [2]  
(b) Rearrange the formula to make  $u$  the subject. [2]
- 2 A plan of a flat is drawn on a scale 1 : 40.  
(a) The width of the flat on the plan is 20 cm. Find, in metres, the actual width of the flat. [1]  
(b) The floor area of the plan is 900 cm<sup>2</sup>. Find, in square metres, the actual area of the flat. [2]  
(c) The flat is drawn on another plan of scale 1 : 50. What is the width of the flat on this plan? [1]
- 3 The population of Asia is approximately 4 543 000 000. Correct to the nearest 1 000 000.  
(a) Write down the least possible population of Asia. [1]  
(b)  $4\,543\,000\,000 = k$  billion. Find  $k$ . [1]  
(c) The area of Asia is  $4.34 \times 10^7$  square kilometres. Calculate the number of people per square kilometre in Asia. Give your answer in standard form. [2]

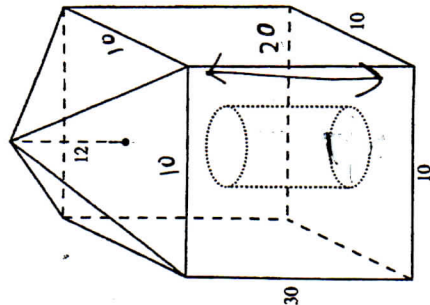
157



The diagram shows the speed-time graph of the journey of a motorcyclist.

- (a) How long did the motorcyclist travel at a constant speed? [1]  
(b) Find the acceleration of the motorcyclist in the first hour. [1]  
(c) Calculate the average speed of the motorcyclist for the entire journey. [3]
- 5 Given that  $p$  is an integer,  
(a) Write down an expression for the next odd number after  $2p - 1$ . [1]  
(b) Find, in its simplest form, the expression for the sum of these two odd numbers. [1]  
(c) Show that the sum of the squares of these two odd numbers is  $8p^2 + 2$ . [2]  
(d) Explain why the sum of the squares is an even number. [2]





A toy is made up of a right-pyramid and a cuboid. The sides of the base are 10 cm each. The height of the cuboid is 30 cm. The vertical height of the right-pyramid is 12 cm.

A cylindrical hole of diameter 5 cm and height 20 cm is removed from below the toy for the purpose of inserting a rod.

- Calculate the volume of the toy. [3]
  - The surface of the toy will be painted. 100 ml of paint can paint an area of 10 000 cm<sup>2</sup>. Calculate, to the nearest ml, the volume of paint needed to paint 10 such toys. [4]
- 
- Simplify  $4x - 3(2y - x)$ . [2]
  - Factorise completely  $-6x^2 + 27x - 27$ . [2]
  - Simplify  $\frac{7x}{(x-6)^2} + \frac{2}{6-x}$ . [3]

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

A stone is thrown from the top of a cliff. The height,  $h$  metres, of the stone above sea level  $t$  seconds after it is released can be modeled by the equation  $h = 80 + 16t - 5t^2$ . Some corresponding values of  $t$  and  $h$  are given in the table below.

|     |    |    |    |    |    |    |     |
|-----|----|----|----|----|----|----|-----|
| $t$ | 0  | 1  | 2  | 3  | 4  | 5  | 6   |
| $h$ | 80 | 91 | 92 | 83 | 64 | 35 | $p$ |

- Calculate the value of  $p$ . [1]
- Using a scale of 2 cm to represent 1 second, draw a horizontal  $t$ -axis for  $0 \leq t \leq 6$ . Using a scale of 1 cm to represent 10 metres, draw a vertical  $h$ -axis for  $-20 \leq h \leq 100$ .  
On your graph, plot the points given in the table and join them with a smooth curve. [3]
- Use your graph to estimate
  - the maximum height of the stone above sea level, [1]
  - the time taken for the stone to hit the water. [1]
- By drawing a tangent, find the gradient of the curve at (4, 64). [2]



Cash Price \$780

### Hire-Purchase Terms Available

Jimmy buys this laptop on hire-purchase.  
He has to pay a deposit of 20%.

- (a) Calculate the amount of deposit that Jimmy has to pay. [1]

For the remaining amount, he can choose from 2 different packages.

| Package A                      | Package B                                      |
|--------------------------------|------------------------------------------------|
| 12 monthly instalments of \$55 | Repayment at 3.8% simple interest over 2 years |

The laptop weighs 1.25 kg and will be shipped from another country. He can choose from two shipping rates:

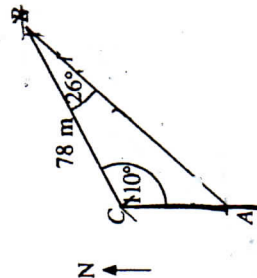
| By Air                                                                              |                                                                                     | By Sea      |          |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------|----------|
|  |  |             |          |
| Per 100g                                                                            | \$50.91                                                                             | Per 100g    | \$50.39  |
| add (+)                                                                             |                                                                                     | add (+)     |          |
| Base Charge                                                                         | \$513.40                                                                            | Base Charge | \$539.90 |

- (b) Which combination is the most value-for-money? Justify your answer with calculations. [6]

### Section B (8 marks)

Answer one question from this section. Each question carries 8 marks.

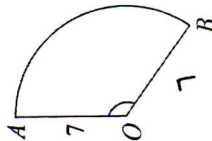
10 (a)



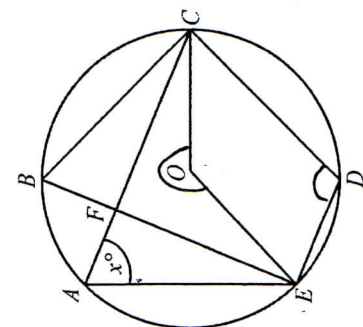
A, B and C are on level horizontal ground.  
 $BC = 78\text{ m}$ , angle  $ACB = 110^\circ$  and angle  $ABC = 26^\circ$ . C is due north of A.

- (i) Calculate the length AC. [2]  
(ii) Find the bearing of A from B. [1]

(b)



OAB is a sector of radius 7 cm and a perimeter of 28 cm.  
Find angle AOB in radians. [2]



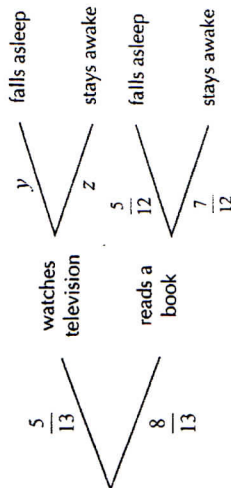
(c)

A circle has centre  $O$ .  $A$ ,  $B$ ,  $C$ ,  $D$  and  $E$  lies on the circle. Angle  $EAC = x^\circ$ .

Find, in terms of  $x$ ,

- (i) angle  $EBC$ , [1]
- (ii) angle  $EDC$ , [1]
- (iii) reflex angle  $EOC$ . [1]

- 11 (a) Every night, Jamie either watches television or reads a book. She either falls asleep or stays awake while doing so. The probability tree diagram is shown below.



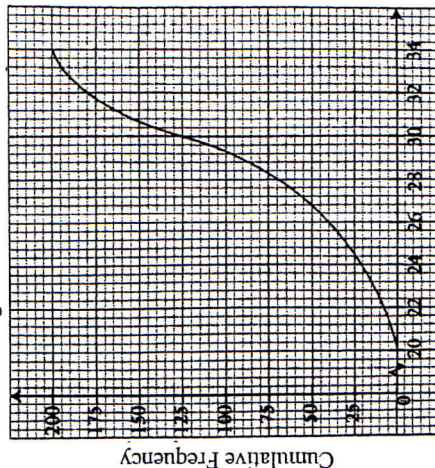
- (i) Find  $y$  given that the probability of Jamie watching television and falling asleep is  $\frac{5}{39}$ . [1]

- (ii) Find  $z$ . [1]

Find the probability that Jamie will

- (iii) stay awake on a particular night, [1]
- (iv) watch television and fall asleep on two consecutive nights. [1]

- (b) The weights of 200 students were measured. The cumulative frequency curve shows the distribution of the weights.



Weight of Students (kg)

From the graph, estimate

- (i) the interquartile range, [2]
- (ii) the value of  $x$ , given that 37.5% of students weighed  $x$  kilograms or more. [2]

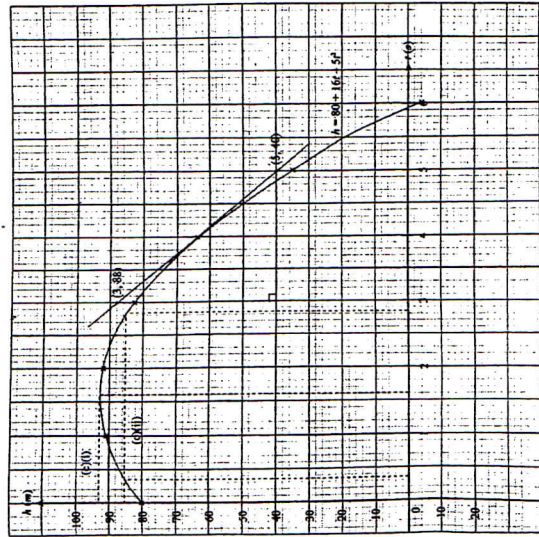
End of Paper

| Qn | Steps/Answer                                                                                                                                                                                                               | Remarks          | Total |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------|
| 1  | (a) $v^2 = 30^2 - 2(9.8)(24.1)$<br>$v = 20.7$<br>(b) $v^2 + 2gh = u^2$<br>$u = \pm\sqrt{v^2 + 2gh}$                                                                                                                        |                  | [4]   |
| 2  | (a) 8m<br>(b) 1cm : 0.4m<br>1cm <sup>2</sup> :0.16m <sup>2</sup><br>900 : 144 m <sup>2</sup><br>(c) 16cm                                                                                                                   |                  | [4]   |
| 3  | (a) 4 542 500 000<br>(b) $k = 4.543$<br>(c) 105<br>$= 1.05 \times 10^2$                                                                                                                                                    | Accept 104.677.. | [4]   |
| 4  | (a) 2hr<br>(b) 60 km/h <sup>2</sup><br>(c) Total Distance = $\frac{1}{2}(40 + 100)(1) + (100 \times 2) + \frac{1}{2}(100)(1)$<br>$= 320$ km<br>Average speed = $320 \div 4$<br>$= 80$ km/h                                 |                  | [5]   |
| 5  | (a) $2p+1$<br>(b) $2p-1+2p+1$<br>$= 4p$<br>(c) $(2p-1)^2 + (2p+1)^2$<br>$= 4p^2 - 4p + 1 + 4p^2 + 4p + 1$<br>$= 8p^2 + 2$<br>(d) $8p^2 + 2 = 2(4p^2 + 1)$<br>As $2(4p^2 + 1)$ is divisible by 2, the sum is an even number |                  | [6]   |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                 |     |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-----|
| 6 | (a) Volume of pyramid = $\frac{1}{3}(10 \times 10)(12)$<br>Volume of cuboid<br>$= \frac{1}{3}(10 \times 10)(12) + (10 \times 10 \times 30) - \pi(2.5)^2(20)$<br>$= 3010$ cm <sup>3</sup><br>(b) Height of triangular surface = $\sqrt{5^2 + 12^2} = 13$ cm<br>Total surface area<br>$= 4 \times (\frac{1}{2})(13)(10) + 4 \times (30)(10) + (10)(10) + 2\pi(2.5)(20)$<br>$= 1874$ cm <sup>2</sup><br>Amount of paint needed for 1 toy = $\frac{1874}{10000} \times 100 = 18.74$ ml<br>Amount of paint needed for 10 toys = 188 ml | Accept 3007 cm <sup>3</sup>     | [7] |
| 7 | (a) $4x - 3(2y - x)$<br>$= 4x - 6y + 3x$<br>$= 7x - 6y$<br>(b) $-6x^2 + 27x - 27$<br>$= -3(2x^2 - 9x + 9)$<br>$= -3(2x - 3)(x - 3)$<br>(c) $\frac{7x}{2} - \frac{x-6}{(x-6)^2} - \frac{x-6}{7x-2(x-6)}$<br>$= \frac{7x}{2} - \frac{x-6}{(x-6)^2} - \frac{5x+12}{(x-6)^2}$                                                                                                                                                                                                                                                         | Should not round down to 187 ml | [7] |



8 (a)  $p = -4$   
(b)



- (ci) Maximum height above sea level = 93 m  
(cii) Time taken to hit the water = 5.9 s  
(d) Correct tangent drawn  
Gradient at (4, 64) = -24 m/s

$$\text{Deposit} = \frac{20}{100} \times 780 = \$156$$

Total amount paid if he chooses Package A =  
 $156 + 12 \times 55 = \$816$

$$\text{Interest for Package B} = \frac{624 \times 3.8 \times 2}{100} = \$47.427$$

Total amount paid under Package B =  
 $156 + 624 + 47.427 = \$827.424$

Cost of shipping by air =  $(1250 + 100) \times 0.91 + 13.40$   
= \$24.775

Cost of shipping by sea =  $(1250 + 100) \times 0.39 + 39.90$   
= \$44.775

Cheapest combination for Jimmy would be Package A and shipping by air.

Section B (Choose one question)

|    |         |                                                                                                                                                                            |                                                                                                   |     |
|----|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-----|
| 10 | (a) (i) | $\angle CAB = 180 - 110 - 26 = 44^\circ$<br>$\frac{AC}{\sin 26^\circ} = \frac{78}{\sin 44^\circ}$<br>$AC = 49.2 \text{ m}$<br>bearing of A from B = $180 + 44 = 224^\circ$ | Using alternate angles                                                                            | [8] |
|    | (b)     | $28 - 7 - 7 = 7 \times \angle AOB$<br>angle $AOB = 2$ radians<br>angle $EBC = x^\circ$<br>angle $EDC = (180 - x)^\circ$<br>reflex angle $EOC = (360 - 2x)^\circ$           | Angles in same segment<br>Angles in opp segment<br>Angle at centre = twice angle at circumference |     |
| 11 | (a) (i) | $y = \frac{1}{3}$                                                                                                                                                          | $\frac{5}{39} + \frac{5}{13}$                                                                     | [8] |
|    | (ii)    | $z = \frac{2}{3}$                                                                                                                                                          |                                                                                                   |     |
|    | (iii)   | $\frac{8}{13}$                                                                                                                                                             |                                                                                                   |     |
|    | (iv)    | $\frac{25}{1521}$                                                                                                                                                          |                                                                                                   |     |
|    | (b) (i) | Interquartile Range = $30.4 - 26.4$<br>= 4 kg<br>37.5% students = 75 students<br>$x = 30$                                                                                  | $(\frac{5}{39})^2$<br>M1 if at least one of the quartiles are correct                             |     |
|    | (ii)    |                                                                                                                                                                            |                                                                                                   |     |