NORTH VISTA SECONDARY SCHOOL

END-OF-YEAR EXAMINATION 2018

60

NAME: _____( ) **CLASS:** _____

SUBJECT: ELEMENTARY MATHEMATICS **DATE: 4 OCTOBER 2018**

LEVEL/STREAM: SECONDARY 3 EXPRESS **TIME: 1 HOUR 30 MINUTES**

CODE: 4048/01

READ THESE INSTRUCTIONS FIRST

Write your name, register number and class on all the work you hand in.
Write in dark blue or black pen.
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 degree to one decimal place.
For π, use either your calculator value or 3.142, unless the question requires 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 60.

For Examiner's Use	
Category	**Question**
Accuracy	
Brackets	
Fractions	
Units	
Others	
Marks Deducted	

This question paper consists of 15 printed pages.

[Turn Over

Mathematical Formulae

Compound Interest

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

Mensuration

Curved surface area of a cone $= \pi rl$

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

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

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

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

Arc length $= r\theta$, where θ 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 The total number of visitors arriving in Singapore in 2008 was 1.12×10^7.
The visitors spent a total of 16.5 billion dollars. [1 billion = 10^9]

(a) 1.12×10^7 can be written as k million. [1 million = 10^6]
Find k.

Answer $k =$ ..... [1]

(b) What is the average amount of money spent by each visitor?
Give your answer correct to the nearest dollar.

Answer $ ..... [1]

---

2 Simplify the following

(a) $5x^2y^{-1}\times x^{-3}y$,

Answer ..... [1]

(b) $\left(\frac{16}{x^4}\right)^{-\frac{1}{2}}$.

Answer ..... [2]

---

3 **(a)** Without the use of calculator, evaluate $3^0 + 9^{-1} + 3^{-2}$.

Answer ..... [1]

(b) Solve $\frac{8^{2x-1}}{4} = \frac{1}{16^x}$.

Answer ..... [3]

---

4 In a class of 10 girls, their heights are 158 cm, 155 cm, 146 cm, 149 cm, 158 cm, 155 cm, 165 cm, 172 cm, 155 cm and 157 cm.

For these heights, find

(a) the mode,

Answer ..... cm [1]

(b) the mean,

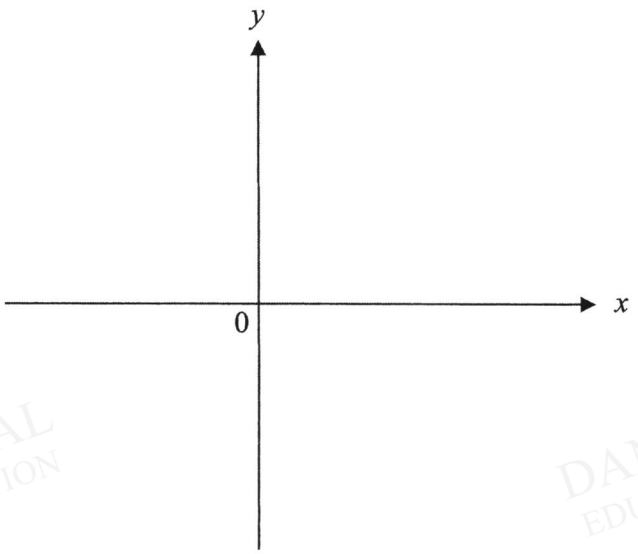
Answer ..... cm [2]

(c) the median.

Answer ..... cm [1]

---

5 **(a)** Sketch the graph of $y = -(x-4)(x+2)$.



[2]

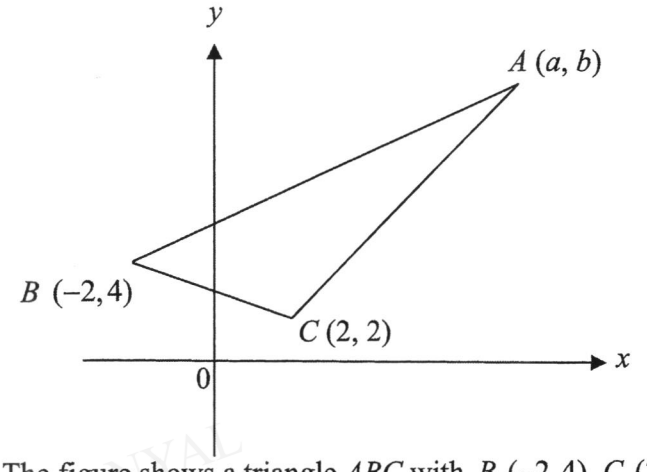
(b) Write down the equation of the line of symmetry of the graph.

Answer ..... [1]

(c) Find the coordinates of the turning point.

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

6



The figure shows a triangle ABC with $B\ (-2,4)$, $C\ (2,2)$ and $A\ (a,b)$.
The gradients of BC, AC and AB are $-2n$, $2n$, n respectively.

(a) Find

(i) the value of n,

Answer $n =$ ..... [1]

(ii) the coordinates of A,

Answer A (..... , ...) [3]

6 **(a)** **(iii)** the length of BC.

Answer ..... units [1]

(b) Given that the area of triangle ABC is 12 units^2, find the length of the perpendicular line drawn from A to BC.

Answer ..... units [2]

---

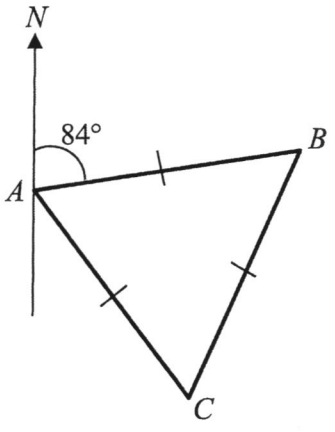
7 **(a)** Solve the inequality $\frac{2}{3}(x+1) \leq x+2 < -(2x-9)$.

Answer ..... [3]

(b) Hence, state the largest prime number which satisfies the above inequality.

Answer ..... [1]

8



In the diagram above, the points A, B and C form an equilateral triangle and the bearing of B from A is $084°$.

Find the bearing of

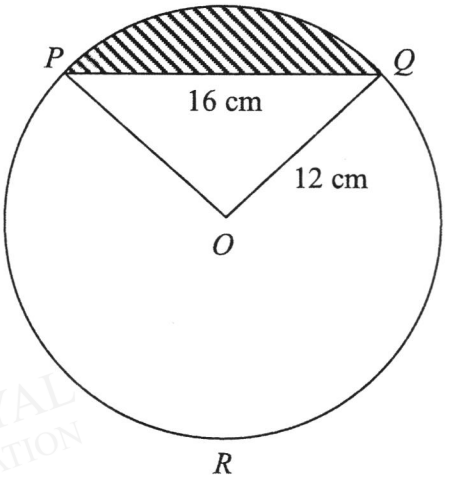
(a) C from A,

Answer .....° [1]

(b) C from B.

Answer .....° [2]

9 The figure shows a circle with centre O and passes through the points P, Q and R. It has a radius of 12 cm and $PQ = 16$ cm.



(a) Show that angle $POQ = 1.46$ radians, correct to 3 significant figures.

Answer .....

.....

..... [1]

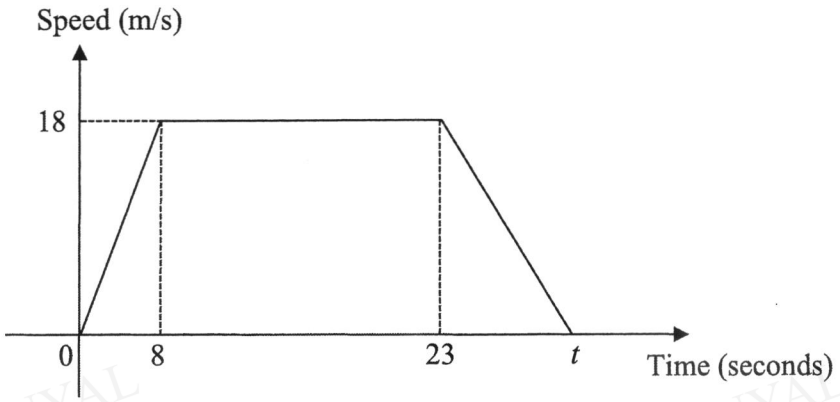
(b) Find the length of the major arc PRQ.

Answer ..... cm [2]

(c) Find the area of the shaded region.

Answer ..... cm^2 [3]

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



(a) What is the acceleration of the object at $t = 10$ seconds?

Answer ..... m/s^2 [1]

(b) Find the speed of the object when $t = 5$ seconds.

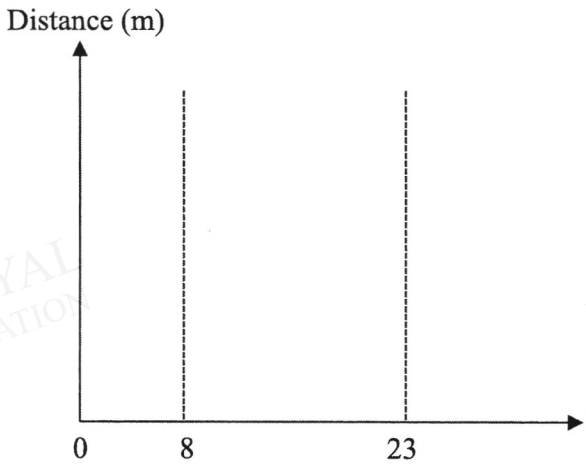
Answer ..... m/s [1]

(c) Find the value of t if the total distance travelled by the object is 450 m.

Answer $t =$ ..... [2]

10 (d) On the axes in the answer space below, sketch the distance-time graph for the first 23 seconds and indicate clearly, on the vertical axis, the distance travelled at $t = 8$ s and $t = 23$ s.

Answer



[2]

11 Two machines, A and B, are used to manufacture ice cream tubs. 5 ice cream tubs manufactured by each machine are randomly selected from each machine. The mass of the ice cream tubs manufactured by Machine A are weighed and shown in the table below.

Machine A (mass in g)	505	498	502	502	503

(a) Find the mean and standard deviation of the mass of the ice cream tubs manufactured by Machine A.

Answer Mean .....g [1]

Standard Deviation .....g [2]

(b) Machine B

Mean = 502 g

Standard Deviation = 3.16 g

Based on your answer in **(a)** and information given above, decide and explain which machine you will recommend to ice cream manufacturers.

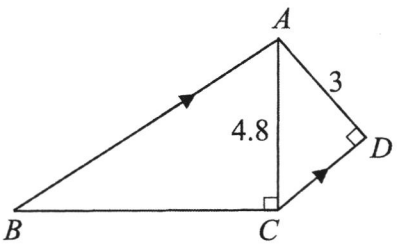
Answer .....

.....

.....

..... [1]

12



The figure is a trapezium, which is made up of two right angled triangles, triangle ABC and triangle ACD. $AC = 4.8$ cm and $AD = 3$ cm.

Calculate

(a) angle ACD,

Answer ..... ° [2]

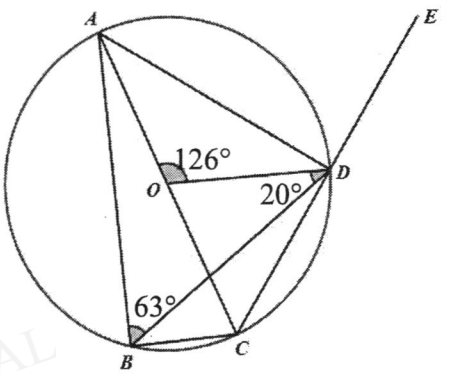
(b) AB,

Answer ..... cm [2]

(c) area of $ABCD$.

Answer ..... cm^2 [2]

13 In the diagram, A, B, C and D lie on the circumference of the circle.
Angle $AOD = 126°$, angle $ABD = 63°$ and angle $ODB = 20°$.



(i) Explain why O is the centre of the circle.

Answer .....

.....

..... [1]

(ii) Find, giving reasons for each answer,

(a) angle ACD,

Answer ..... [1]

(b) angle BAD,

Answer .....

.....

..... [2]

(c) angle BCD.

Answer ..... [1]

13 (iii) Is OD parallel to BC? Explain your answer.

Answer .....

.....

.....

.....

..... [2]

End of Paper

NORTH VISTA SECONDARY SCHOOL

END-OF-YEAR EXAMINATION 2018

60

NAME: _____( ) **CLASS:** _____

SUBJECT: MATHEMATICS (PAPER 2) **DATE: 8 OCTOBER 2018**

LEVEL/STREAM: SECONDARY 3 EXPRESS **TIME: 1 HOUR 30 MINUTES**

CODE: 4048/2

READ THESE INSTRUCTIONS FIRST

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

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Statistics

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$$\text{Standard Deviation} = \sqrt{\frac{\Sigma fx^2}{\Sigma f} - \left(\frac{\Sigma fx}{\Sigma f}\right)^2}$$

Answer **all** the questions.

1 **(a)** Express as a single fraction $\frac{3x}{(x-3)^2} - \frac{7}{2x-6}$. [3]

(b) Simplify $\frac{2s^2+9st-5t^2}{3s^2-75t^2} \times \frac{s-5t}{5}$. [3]

(c) It is given that $\frac{1}{a}+\frac{1}{b}=\frac{1}{c^2}$.

(i) Find b when $a=3$, $c=-1$. [2]

(ii) Express c in terms of a and b. [3]

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2 **(a)** **(i)** The cash price of a particular car is \$94000.

Shawn decides to buy this car. He paid a deposit of \$10000 and the rest by monthly instalments of \$1090 over a period of $7\frac{1}{2}$ years. The bank charges an interest of i % per annum on the amount loaned.

Calculate the value of i. [3]

(ii) Betty buys an identical car which costs the same.

She pays a deposit of one-fifth of the cash price. She then borrows the remaining cost for 3 years at compound interest of 3% per year.

Calculate the total amount of money Betty paid for the car. [4]

(b) The exchange rate between US dollars (\$) and Korean won (₩) is \$1 = 1082.50₩.

Bill bought 166500₩ from the bank.

Calculate the total amount in US dollars he paid the bank. Leave your answer to the nearest dollar. [2]

---

3 Ray represented his class in a 10 km race. He started running at a speed of x km/h. After 2 km, he increased his speed by 1 km/h and ran the remaining distance at this speed.

(i) Find and simplify, in terms of x, an expression for the time taken by Ray to complete the race. [2]

(ii) Given that Ray's average speed for the whole race was 10.5 km/h, form an equation in x and show that it reduces to $10x^2 - 95x - 21 = 0$. [3]

(iii) Solve the equation $10x^2 - 95x - 21 = 0$. Give your answers correct to 2 decimal places. [3]

(iv) Find the time, in hours, Ray would have taken if he had ran the entire race at his initial speed. [1]

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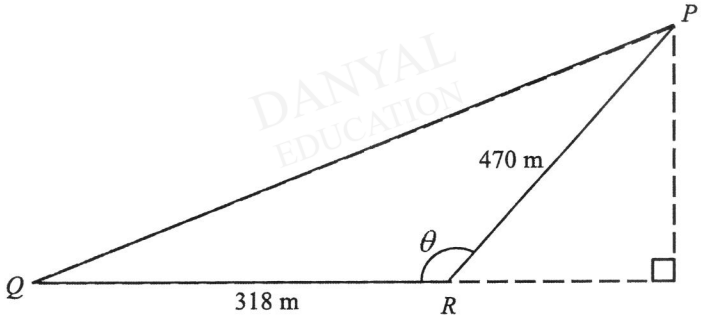
4 The diagram shows three points, P, Q and R on a piece of horizontal land. $PR = 470$ m and $QR = 318$ m.



It is given that $\sin\theta = \frac{7}{25}$ and θ is obtuse.

(a) Calculate the area of ΔPQR. [2]

(b) Without the use of a calculator, show that the value of $\cos\theta = -\frac{24}{25}$. [2]

(c) Hence, find the distance PQ. [3]

(d) T is the top of a building that is standing vertically at R and the angle of elevation of T from P is $12°$. Calculate the height of the building. [2]

(e) Eli walks along the path PQ until he reaches a point E. Calculate the largest angle of depression from T to E. [3]

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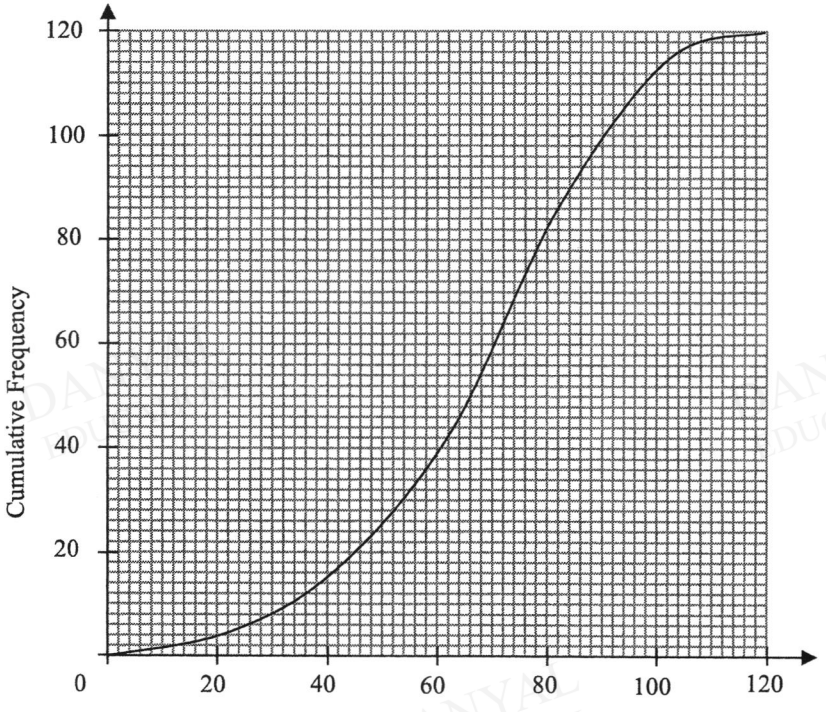
5 The graph shows the cumulative frequency curve for the number of hours of community service accumulated over four years by 120 students in Vista Secondary School.



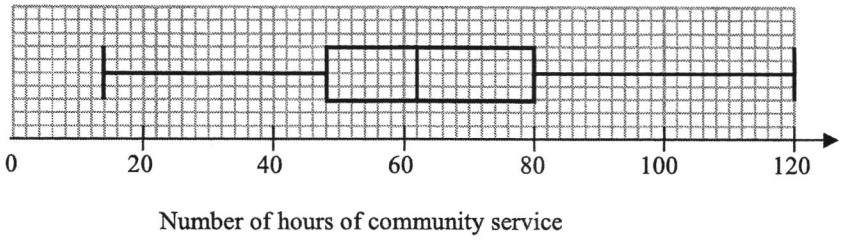
(a) Use your graph to find the

(i) median, [1]

(ii) interquartile range, [2]

(iii) percentage of students who accumulated more than 100 hours of community service. [2]

(b) The number of hours of community service accumulated by another 120 students in Venus Secondary School is represented in the following box-and-whisker plot.



Make two comparisons between the number of hours the students spent on community service in the two schools. [2]

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

An analyst was studying the effect of the introduction of a new policy to a company's business profit. He felt that the amount of profit, y hundred thousand dollars, over a period of x months could be modelled by the equation

$$y = \frac{x^3}{5} + \frac{10}{x} - 10 .$$

Some corresponding values of x and y are given in the following table.

x	0.5	1.5	2	3	4	4.5	5
y	10.03	–2.66	–3.4	–1.27	5.30	10.45	17.00

(a) Using a scale of 2 cm to represent 1 unit, draw a horizontal x-axis for $0 \le x \le 5$.
Using a scale of 1 cm to represent 1 unit, draw a vertical y-axis for $-4 \le y \le 18$.
On your axes, plot the points given in the table and join them with a smooth curve. [3]

(b) Use your graph to state the period when the company is suffering a loss. [2]

(c) Use your graph to find the solution(s) to the equation $\frac{x^3}{5} + \frac{10}{x} = 15$ in the range $0 \le x \le 5$. [2]

(d) By drawing a tangent, find the gradient of the curve at $(1.5, -2.66)$. [2]

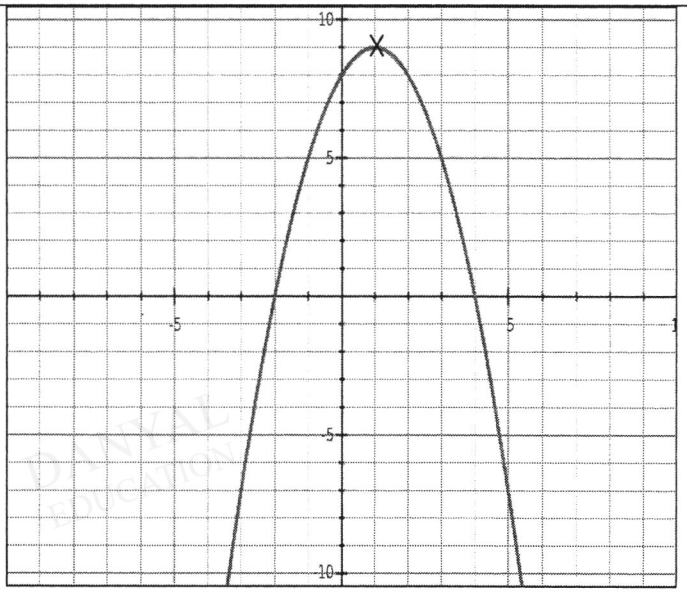
(e) **(i)** On the same axes, draw the line $y = 3x + 1$ for $0 \le x \le 5$. [1]

(ii) The x-coordinates of the points where the line in **(e)(i)** intersects the curve are the solutions of the equation $x^4 - ax^2 - bx + 50 = 0$. Find the value of a and of b. [2]

END OF PAPER

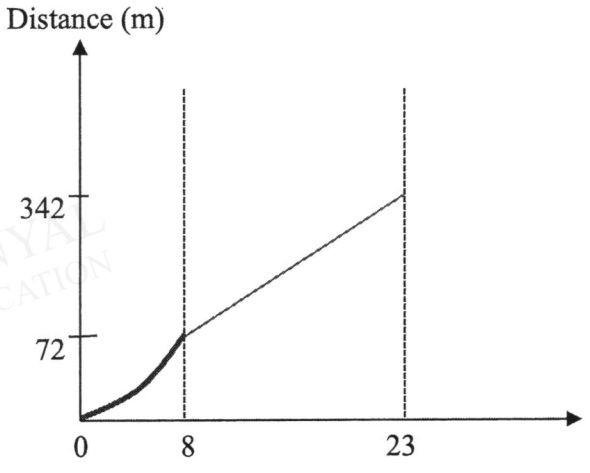
Sec 3E E.Maths EOY P1 2018 Solutions

Qn	Solution	Marks
1a	$1.12\times10\times10^6$ $=11.2\times10^6$ $k=11.2$	 B1
1b	$\frac{16.5\times10^9}{1.12\times10^7}$ $=\$1473.2142$ $=\$1473$	 B1
2a	$5x^2y^{-1}\times x^{-3}y$ $=5x^{-1}y^0$ $=\frac{5}{x}$	 B1
2b	$\left(\frac{16}{x^4}\right)^{-\frac{1}{2}}$ $=\left(\frac{x^4}{16}\right)^{\frac{1}{2}}$ $=\frac{x^2}{4}$	 B2
3a	$3^{-0}+(9)^{-1}+3^{-2}$ $=1+\frac{1}{9}+\frac{1}{3^2}$ $=1\frac{2}{9}$	 B1
3b	$\frac{8^{2x-1}}{4}=\frac{1}{16^x}$ $\frac{2^{3(2x-1)}}{2^2}=\frac{2^0}{2^{4x}}$ $6x-3-2=0-4x$ $6x-5=-4x$ $10x=5$ $x=\frac{1}{2}$	 M1 (same base) M1 simplify A1
4a	155 cm	
4b	Mean $=\frac{1570}{10}$ $=157cm$	M1 A1

4c	$\frac{155+157}{2}=156$	B1
5a		Shape y-intercept =8 x-intercept = 4, -2 B2
5b	$\frac{4+(-2)}{2}$ $=1$ $x=1$	B1
5c	(1, 9)	B1
6ai	Gradient of BC $=\frac{4-2}{-2-2}$ $=-\frac{1}{2}$ $-2n=-\frac{1}{2}$ $n=\frac{1}{4}$	B1

6aii	Gradient of $AC = 2n$ $\frac{b-2}{a-2} = 2(\frac{1}{4})$ $2b-4 = a-2$ $2b-a = 2$ ----(1) Gradient of $AB = n$ $\frac{b-4}{a+2} = \frac{1}{4}$ $4b-16 = a+2$ $4b-18 = a$ ------(2) *Sub* (2) into (1) $2b-(4b-18) = 2$ $-2b+18 = 2$ $b = 8$ $a = 4(8)-18$ $a = 14$ $A(14,8)$	M1 M1 A1
6aiii	Length of BC $= \sqrt{(-2-2)^2+(4-2)^2}$ $= \sqrt{20}$ $= 4.4721$ $= 4.47 units$	B1
6b	$\frac{1}{2} \times \sqrt{20} \times h = 12$ $h = 5.3665$ $h = 5.37 units$	M1 A1
7a	$\frac{2}{3}(x+1) \le x+2 < -(2x-9)$ $\frac{2}{3}(x+1) \le x+2$ $\frac{2}{3}x+\frac{2}{3} \le x+2$ $-\frac{1}{3}x \le 1\frac{1}{3}$ $x \ge -4$ $x+2 < -(2x-9)$ $3x < 7$ $x < 2\frac{1}{3}$ $-4 \le x < 2\frac{1}{3}$	M1 M1 A1

7b	2	B1
8a	Bearing of C from A $=84°+60°$ $=144°$	 B1
8b	$84°-60°=24°$ Bearing of C from B $=180°+24°$ $=204°$	M1 A1
9a	$\sin\theta=\frac{8}{12}$ $\theta=0.72972$ $\angle POQ=0.72972\times 2$ $=1.45944$ $=1.46rad(shown)$	 B1
9b	Reflex angle POQ $=2\pi-1.45944$ $=4.82374rad$ Major arc PRQ $=r\theta$ $=12(4.82374)$ $=57.88488$ $=57.9cm$	 M1 A1
9c	Area of shaded region $=\frac{1}{2}(12)^2(1.45944)-\frac{1}{2}(12)^2\sin 1.45944$ $=105.07968-71.55405$ $=33.52563$ $=33.5cm^2$ *OR* $\theta=1.45944\times\frac{180°}{\pi}$ $=83.61975$ $Area=\frac{83.61975}{360}\times\pi(12)^2-\frac{1}{2}(12)^2\sin 83.61975$ $=33.5356$ $=33.5cm^2$	 M2 A1 M2 A1
10a	$0\ m/s^2$	B1
10b	$\frac{v}{5}=\frac{18}{8}$ $v=11\frac{1}{4}m/s$	 B1

10c	$\frac{1}{2}\times(15+t)(18)=450$ $15+t=50$ $t=35s$	M1 A1
10d	*Answer*  	Shape – B1 Indicate correct distance – B1
11a	Mean $=\frac{2510}{5}$ $=502g$ SD for Machine A $=\sqrt{\frac{505^2+498^2+502^2+502^2+503^2}{5}-\left(\frac{2510}{5}\right)^2}$ $=\sqrt{\frac{1260046}{5}-(\frac{2510}{5})^2}$ $=2.2803$ $=2.28$	B1 Either or M1 A1
11b	I will recommend Machine A as the standard deviation is smaller which means the machine is more consistent in manufacturing the ice-cream tubs.	B1
12a	$\sin\angle ACD=\frac{3}{4.8}$ $\angle ACD=38.6821$ $=38.7°$	M1 A1

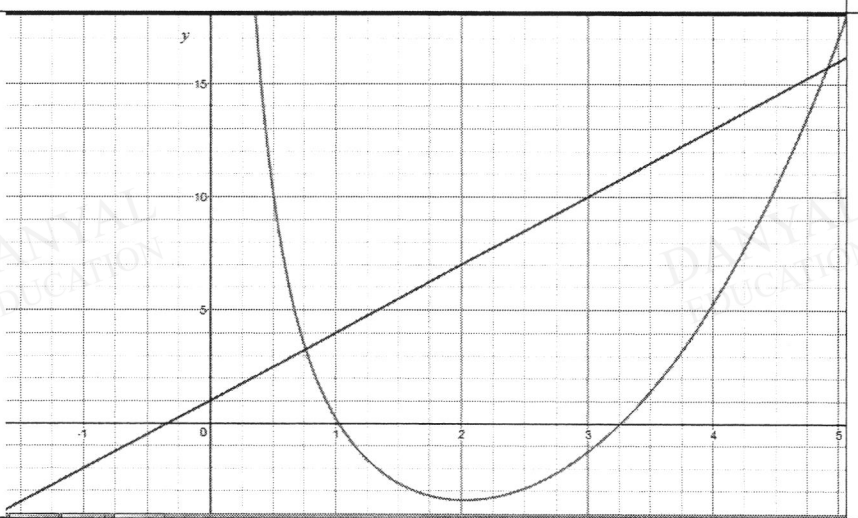
12b	$\cos \angle BAC = \frac{4.8}{AB}$ $\cos 38.6821 = \frac{4.8}{AB}$ $AB = \frac{4.8}{\cos 38.6821}$ $AB = 6.1489$ $AB = 6.15cm$	M1 A1
12c	By Pythagoras' Thereom, $CD = \sqrt{4.8^2 - 3^2}$ $CD = 3.74699$ *Area* $= \frac{1}{2} \times (6.1489 + 3.74699) \times 3$ $= 14.8437$ $= 14.8cm^2$	 M1 A1
13 (i)	Since $\angle AOB = 2 \times \angle ABD$, O is the centre of circle. ($\angle$ at centre $= 2\angle$ at circumference)	B1
13(ii) (a)	$\angle ACD = 63°$ ($\angle$s in same segment)	B1
13(ii) (b)	$\angle ODA = \frac{180 - 126}{2} = 27°$ (base $\angle$s of isos. Δ) $\angle BAD = 180 - 63 - 20 - 27 = 70°$ (sum of $\angle$s in Δ)	M1 A1
13 (ii) (c)	$\angle BCD = 180 - 70 = 110°$ ($\angle$s in opp. segment)	B1
13 (iii)	$\angle DBC = 27°$ ($\angle$s in same segment) Since $\angle$ODB $\neq$ $\angle$DBC, OD is not parallel to BC.	M1 A1

3E EM P2 Marking Scheme

Question	Marking Scheme	Marks
1 (a)	$\frac{3x}{(x-3)^2} - \frac{7}{2(x-3)}$ $= \frac{6x-7(x-3)}{2(x-3)^2}$ $= \frac{-x+21}{2(x-3)^2}$	M1 M1 A1
1 (b)	$\frac{2s^2+9st-5t^2}{3s^2-75t^2} \times \frac{s-5t}{5}$ $= \frac{(2s-t)(s+5t)}{3(s-5t)(s+5t)} \times \frac{s-5t}{5}$ $= \frac{2s-t}{15}$	M2 (cross method and diff of squares) A1
1 (c) (i)	$\frac{1}{3} + \frac{1}{b} = \frac{1}{1}$ $\frac{1}{b} = \frac{2}{3}$ $b = 1\frac{1}{2}$	M1 A1
1 (c) (ii)	$\frac{1}{a} + \frac{1}{b} = \frac{1}{c^2}$ $\frac{b+a}{ab} = \frac{1}{c^2}$ $c^2 = \frac{ab}{b+a}$ $c = \pm\sqrt{\frac{ab}{b+a}}$	M1 A2 (A1 for $\pm$)
2 (a) (i)	Interest $= 1090 \times 7.5 \times 12 + 10000 - 94000 = \$14100$ $14100 = \frac{84000 \times i \times 7.5}{100}$ $i = 2\frac{5}{21}\%$	M1 M1 A1

2 (a) (ii)	Amount borrowed $= \frac{4}{5} \times 94000 = \$75200$ Amount owed $= 75200(1+\frac{3}{100})^3 = \$82173.0704$ Amount Betty paid $= 82173.0704 + \frac{1}{5} \times 94000$ $= \$100973.07 (2dp)$	M1 M1 A1
2 (b)	Total amount $= \frac{101.5}{100} \times 166500 \div 1082.50$ $= \$153.81$ $= \$154$	M1 A1
3 (i)	$\text{Time} = \frac{2}{x} + \frac{8}{x+1}$ $= \frac{2x+2+8x}{x(x+1)}$ $= \frac{10x+2}{x(x+1)} h$	M1 A1
3 (ii)	$\frac{10}{\frac{10x+2}{x(x+1)}} = 10.5$ $\frac{10x(x+1)}{10x+2} = 10.5$ $10x^2 + 10x = 105x + 21$ $10x^2 - 95x - 21 = 0$	M1 M1 M1
3 (iii)	$x = \frac{95 \pm \sqrt{(-95)^2 - 4(10)(-21)}}{2(10)}$ $= \frac{95 \pm \sqrt{9865}}{20}$ $= 9.7161 \text{ or } -0.2161$ $= 9.72 \text{ or } -0.22$	M1 M1 A1
3 (iv)	$\frac{10}{9.7161} = 1.03h$	B1
4 (a)	$\text{Area} = \frac{1}{2}(318)(470)(\frac{7}{25})$ $= 20924\frac{2}{5} m^2$	M1 A1

4 (b)	$\sin\theta = \frac{7}{25}$ $\sin x = \frac{7}{25}$, where x is acute By Pythagoras' Theorem, adj$=\sqrt{25^2 - 7^2} = 24$ $\cos x = \frac{24}{25}$ $\cos\theta = -\frac{24}{25}$	M1 A1
4 (c)	$PQ^2 = 318^2 + 470^2 - 2(318)(470)(-\frac{24}{25})$ $PQ = \sqrt{318^2 + 470^2 - 2(318)(470)(-\frac{24}{25})}$ $= 780.3763$ $= 780m(3sf)$	M2 A1
4 (d)	$\tan 12° = \frac{TR}{470}$ $TR = 470\tan 12°$ $= 99.9015$ $= 99.9m(3sf)$	M1 A1
4 (e)	Let the perpendicular dist be h. $\frac{1}{2}(h)(780.3763) = 20924\frac{2}{5}$ $h = 53.6264$ $= 53.6m(3sf)$ Let the angle of depression be x. $\tan x = \frac{99.9015}{53.6264}$ $x = 61.7734$ $= 61.8°(1dp)$	 M1 M1 A1
5 (a) (i)	70 hours	B1
5 (a) (ii)	Q3=84 Q1=54 IQR $= 84 - 54$ $= 30hours$	 M1 A1
5 (a) (iii)	$\frac{120-112}{120} \times 100\%$ $= 6\frac{2}{3}\%$	M1 A1
5 (b)	IQR for Venus Sec	

	$=80-48$ $=32$ 1. Students from Vista Sec School spend more time on community service as the median hours is higher. 2. Students from Venus Sec School community service hours is more varied as the interquartile range is larger.	B2
6 (a), (e) (i)		P2 C1 B1
6 (b)	$0.75 months < t < 3.25 months (\pm 0.5)$	B2
6 (c)	$\frac{x^3}{5}+\frac{10}{x}=15$ $\frac{x^3}{5}+\frac{10}{x}-10=15-10=5$ $y=5$ $x=0.45$ or 4 (± 0.5)	 M1 A1
6 (d)	$m=\frac{1.6+5}{-0.7-2.6}$ $=-2$ (± 0.5)	M1 (drawing of tangent) A1
6 (e) (ii)	$y=3x+1$ $y=\frac{x^3}{5}+\frac{10}{x}-10$ $3x+1=\frac{x^3}{5}+\frac{10}{x}-10$ $15x^2+5x=x^4+50-50x$ $x^4+50-55x-15x^2=0$ $a=15$ $b=55$	 B1 B1