NORTH VISTA SECONDARY SCHOOL

END-OF-YEAR EXAMINATION 2021

80

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

SUBJECT: MATHEMATICS **DATE: 4 OCTOBER 2021**

LEVEL/STREAM: SECONDARY 1 EXPRESS **TIME: 2 HOURS**

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

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 80.

For Examiner's Use	
Category	**Question No.**
Accuracy	
Brackets	
Fractions	
Units	
Others	
Marks Deducted	

This question paper consists of 17 printed pages.

[Turn over

Section 1

Answer **all** the questions.

1 Express 3.5kg : 780g in its simplest form.

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

---

2 Express 3 centimetres as a percentage of 6 metres.

Answer ..... [2]

---

3 Evaluate the following

(a) $\sqrt{428}-(-3.5)^2$, giving your answer correct to 4 significant figures.

Answer ..... [1]

(b) $\sqrt[3]{\frac{6}{11}}$, giving your answer correct to 2 decimal places.

Answer ..... [1]

---

4 An aeroplane flies a distance of 5540 km from New York to London.
The average speed of the aeroplane is 721 km/h.
Calculate the flight time, in hours and minutes, correct to the nearest minute.

Answer ..... hours ..... minutes [2]

---

5 Factorise $p(2p-6)-5q(p-3)$ completely.

Answer ..... [2]

---

6 Given the set of numbers below

$$1,\ \sqrt{7},\ \sqrt[3]{-64},\ 1.414,\ \left(\frac{2}{3}\right)^2,\ 2\pi,\ 7$$

State

(a) the irrational number(s),

Answer ..... [1]

(b) the integer(s),

Answer ..... [1]

(c) the prime number(s).

Answer ..... [1]

[Turn Over

7 The sum of three consecutive even numbers is 114.
The largest even number is x.

(a) Form an equation in terms of x and show that it reduces to $3x-6=114$.
Answer [1]

(b) Solve the equation $3x-6=114$ to find the smallest number.

Answer smallest number is ..... [2]

---

8 **(a)** Write 750 as a product as its prime factors.

Answer 750 = ... [1]

(b) Written as a product of its prime factors, $450=2\times3^2\times5^2$ and $80=2^4\times5$.
Find the lowest common multiple of 80, 450 and 750.

Answer LCM = ... [1]

(c) $\frac{750}{m}$ is a perfect cube. Find the value of m.

Answer m = ... [1]

(d) Given that the highest common factor of 450 and k is $3^2\times5$, write down the smallest possible value of k.

Answer k = ... [1]

---

9 Carol bought an air ticket to England in **September** at $1500.
In **October**, the airline increased the price of the air ticket by 24%.

(a) Find the cost of the air ticket in **October**.

Answer $..... [1]

(b) In **November**, there was a promotion which gave a reduction of 8% of the price of the air ticket quoted in **October**.
If Carol bought the air ticket in **November**, what is the percentage change in the price as compared to the price in **September**?

Answer ..... % [3]

---

10 Simplify

(a) $4a-3(b-5a)$,

Answer ..... [2]

(b) $\frac{2c+1}{3}+\frac{1-c}{4}$.

Answer ..... [2]

---

11 Solve the following equations.

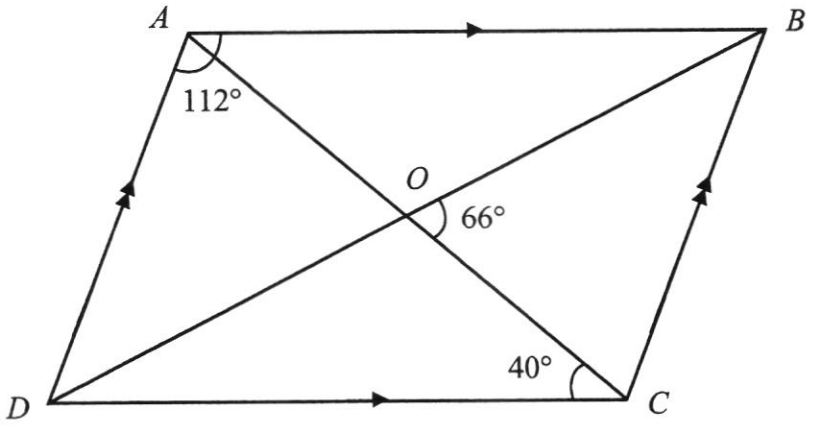
(a) $2(3x+5)+7(x+2)=-2$,

Answer $x =$ ..... [2]

(b) $\dfrac{2}{1-3y}=\dfrac{8}{5y+3}$.

Answer $y =$ ..... [2]

12 $ABCD$ is a parallelogram. $\angle DAB = 112°$, $\angle ACD = 40°$ and $\angle BOC = 66°$.



Stating your reasons clearly, find

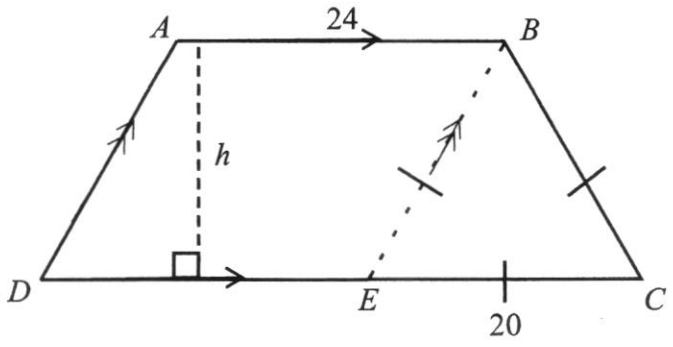
(a) reflex angle ADC,

Answer reflex angle ADC = ...° [2]

(b) angle ABD.

Answer angle ABD = ...° [2]

13 The figure *ABCD* is made up of a parallelogram *ABED,* and an equilateral triangle *BCE*.
AB is parallel to *DC*, *AD* is parallel to *BE*, *AB* = 24 cm, and *BC* = 20 cm.



(a) Find the perimeter of the figure *ABCD*.

Answer ..... cm [1]

(b) Given that the area of triangle *BCE* is 160 cm^2, find the value of *h*.

Answer h = ... [1]

(b) Find the area of the parallelogram *ABED*, giving your answers in $\mathbf{m^2}$.

Answer ..... m^2 [2]

Section 2

Answer **all** the questions

14 (a) Construct and label a quadrilateral $ABCD$ where $BC = 8$ cm, $AD = 9$ cm, $BD = 11$ cm and angle $ABC = 110°$.

AB is drawn for you. [2]

Answer

(b) Measure and write down the length of DC.

Answer ..... cm [1]

(c) A point P lies inside the quadrilateral such that $AP = 7$ cm and $BP = 6$ cm. [1]
Mark clearly the point P.

(d) Hence measure and write down the size of angle APB.

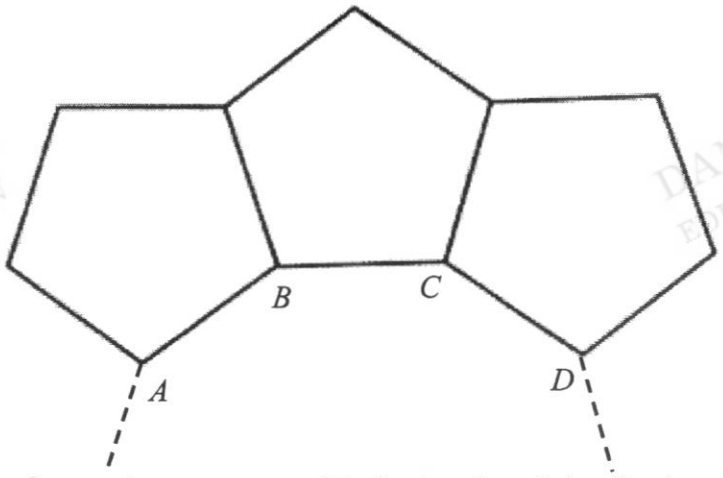
Answer angle APB = ...° [1]

[Turn Over

15 (a) In a n-sided regular polygon, the ratio of an exterior to its interior angle is 1 : 5.
Find the value of n.

Answer n = ... [2]

(b)



Identical **regular pentagons** are used to form a closed ring for decorative purposes. AB, BC and CD are three of the sides of a **second regular** polygon that forms the **closed** ring.

(i) Calculate angle ABC.

Answer angle ABC = ...° [2]

(ii) Find the number of sides of the **second regular** polygon.

Answer ..... [2]

16 Mr Sim drove from Town *A* to Town *B* at at an average speed of 22.5 m/s.

(a) Convert 22.5 m/s to km/h.

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

Mr Sim started driving at 10 55.
Along the way, he took a 15-minute rest before completing the journey.
The ratio of the times he spent on the first part of the journey, resting and the second part of the whole journey is 5 : 3 : 7.

(b) **(i)** Calculate the total time taken, in hours, for the whole journey.

Answer ..... hours [2]

(ii) What time did Mr Sim reach Town B?

Answer ..... [1]

(c) Calculate the distance, in **km**, between Town *A* and Town *B*.

Answer ..... km [2]

17 Ken walks home after school.
The distance from **home**, y metres, after t minutes is given by the formula $y = 800 - 80t$.

The table shows some corresponding values of t and y.

t	0	2	4	6	8	10
y	800	640	p	320	160	0

(a) Find the value of p.

Answer p = ... [1]

(b) On the grid opposite, draw the graph of $y = 800 - 80t$ for $0 \leq t \leq 10$. [2]

(c) Use your graph to find how far Ken will be from **home** after 7 minutes.

Answer ..... m [1]

(d) Use your graph to find how many minutes it takes for Ken to be 200 metres away from **school**.

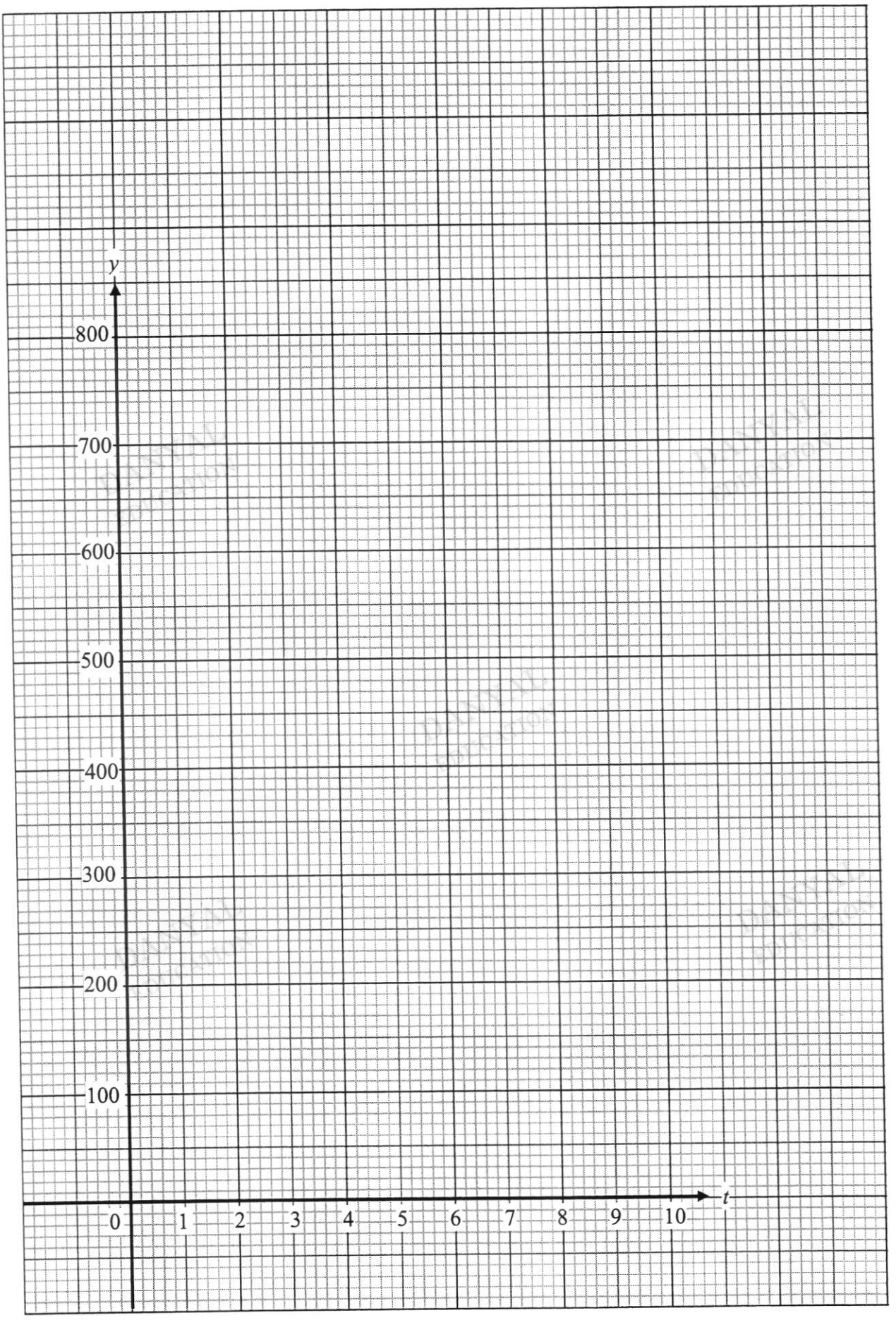
Answer ..... min [1]

(e) State the gradient of the graph.

Answer ..... [1]

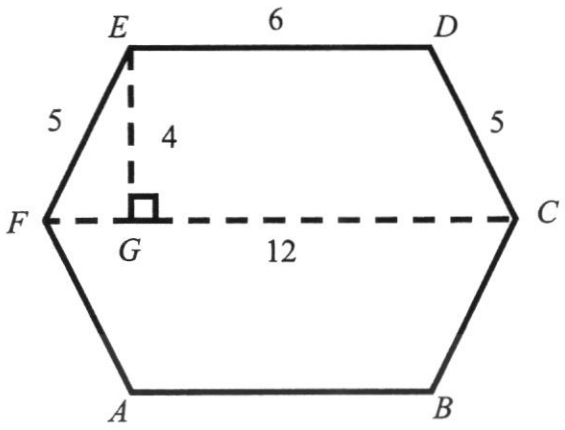
(f) What does the gradient of this graph represent?

Answer ..... [1]



[Turn Over

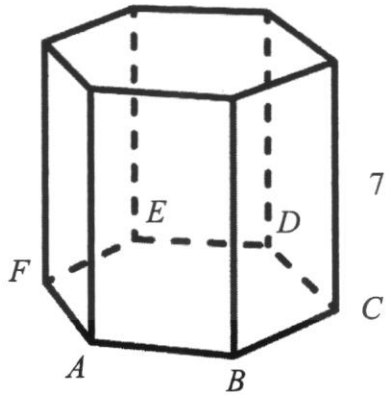
18 The diagram shows two identical trapeziums placed together to form a hexagon $ABCDEF$ such that $AF = FE = BC = CE = 5$ cm.
$AB = ED = 6$ cm, $FC = 12$ cm and $EG = 4$ cm.



(a) Find the area of the hexagon $ABCDEF$.

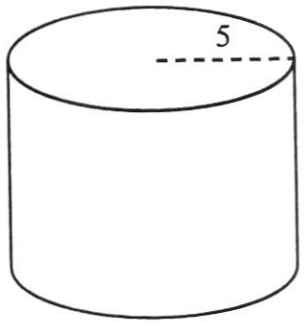
Answer ..... cm^2 [2]

(b) Hexagon $ABCDEF$ is the cross-section of a metallic prism.
The height of the prism is 7 cm.
Calculate the volume of the prism.



Answer ..... cm^3 [1]

18 (c) The metal prism is melted and recast into a cylinder with radius 5 cm.
Find the height of the cylinder.



Answer ..... cm [2]

(d) The external surface area of the cylinder is to be painted in black.
The cost of black painting is \$0.45 per cm^2.
Find the cost of painting the cylinder, giving your answer to the nearest dollar.

Answer \$ ..... [3]

[Turn Over

19 Mrs Lim wishes to switch to a new mobile service provider and is considering the following mobile plans offered by the various telecommunications companies.

Company	Plan	Data per month	Price (per month)	Talktime (mins per month)	Number of SMS per month
W	SIM Only 30GB	30GB	$24.90*	450 *2 cents/min thereafter	450
X	SIM Only 20GB	20GB	$20.00*	200 *3 cents/min thereafter	200
Y	SIM Only 20GB	20GB	$18.00*	100 *4 cents/min thereafter	25
Z	SIM Only 20GB	20GB	$17.90*	120 *2 cents/min thereafter	50

**Prices exclude 7% Goods and Services Tax (GST)*

A new mobile phone, jFone 21, is priced at $1249 (before GST) at all telecommunications companies.

(a) Calculate the total amount that Mrs Lim has to pay in a year (inclusive of GST) for the jFone 21 mobile phone and mobile plan if she signs up with **Company *W***, assuming that she does not exceed the monthly talktime.

Answer $..... [2]

(b) Company *X* offers a storewide 10% discount on the purchase of all mobile phones.
Calculate the total amount that Mrs Tan has to pay in a year (inclusive of GST) for the jFone 21 mobile phone and mobile plan if she signs up with **Company *X***, assuming that she does not exceed the monthly talktime.

Answer $..... [2]

19 (c) Mrs Lim is thinking of switching mobile subscription to either **Company *Y*** or **Company *Z***.
Assuming that she uses about 12GB of data, 200 mins of talktime and 25 SMSes per month, which company offers better value for money?
Support your answer with relevant calculations.

Company ..... offers better value for money.

[3]

End of Paper

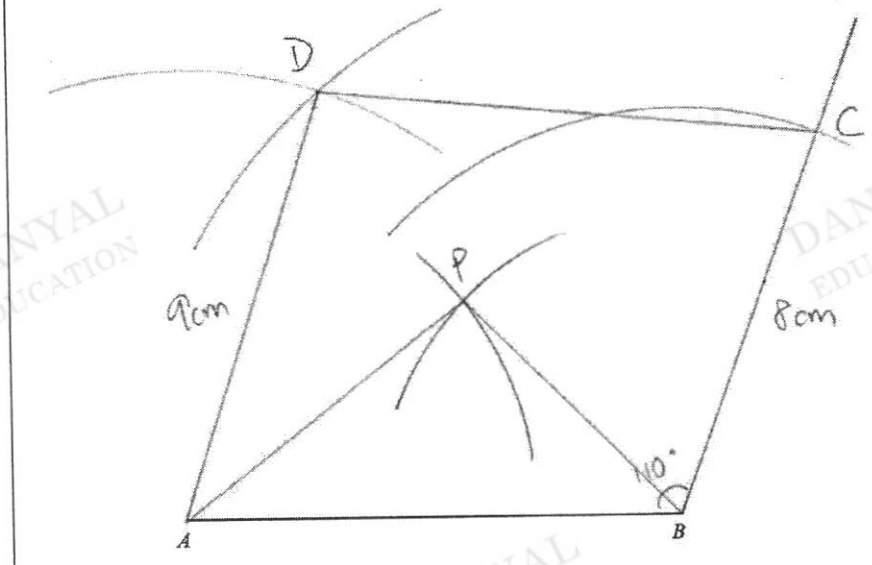
North Vista Secondary School
Secondary 1 Express
End-Of-Year Examinations 2021
Marking Scheme and Markers' Report

Section 1		
	Answer	**Marks**
1	$3.5kg : 780g$ $= 3500 : 780$ $= 175 : 39$	M1 A1
2	$\left(\frac{3\text{ cm}}{6\text{ m}} \times 100\right)\%$ $= \left(\frac{3}{600} \times 100\right)\%$ $= 0.5\%$ OR $\frac{3}{600}$ $= \frac{1.5}{100}$ $= 0.5\%$ OR 600 cm rep 100% 1 cm rep $\frac{100}{600}\%$ 3 cm rep $\frac{100}{600} \times 3$ $= 0.5\%$	M1 [$\frac{3}{600}$ seen] A1
3a	8.438	B1
3b	0.82	B1
4	Time Taken	M1

	$=\frac{5540}{721}$ $=7\frac{493}{721}h$ = 7h41min (nearest min)	A1
5	$p(2p-6)-5q(p-3)$ $=2p(p-3)-5q(p-3)$ $=(p-3)(2p-5q)$	M1 A1
6a	$\sqrt{7}$, 2π	B1
6b	1, 7, $\sqrt[3]{-64}$	B1
6c	7	B1
7a	$x+x-2+x-4=114$ $3x-6=114$	B1
7b	$3x-6=114$ $3x=120$ $x=40$ $x-4=36$	B1 B1
8a	$750=2\times3\times5^3$	B1
8b	$LCM=2^4\times3^2\times5^3$ $=18000$	B1

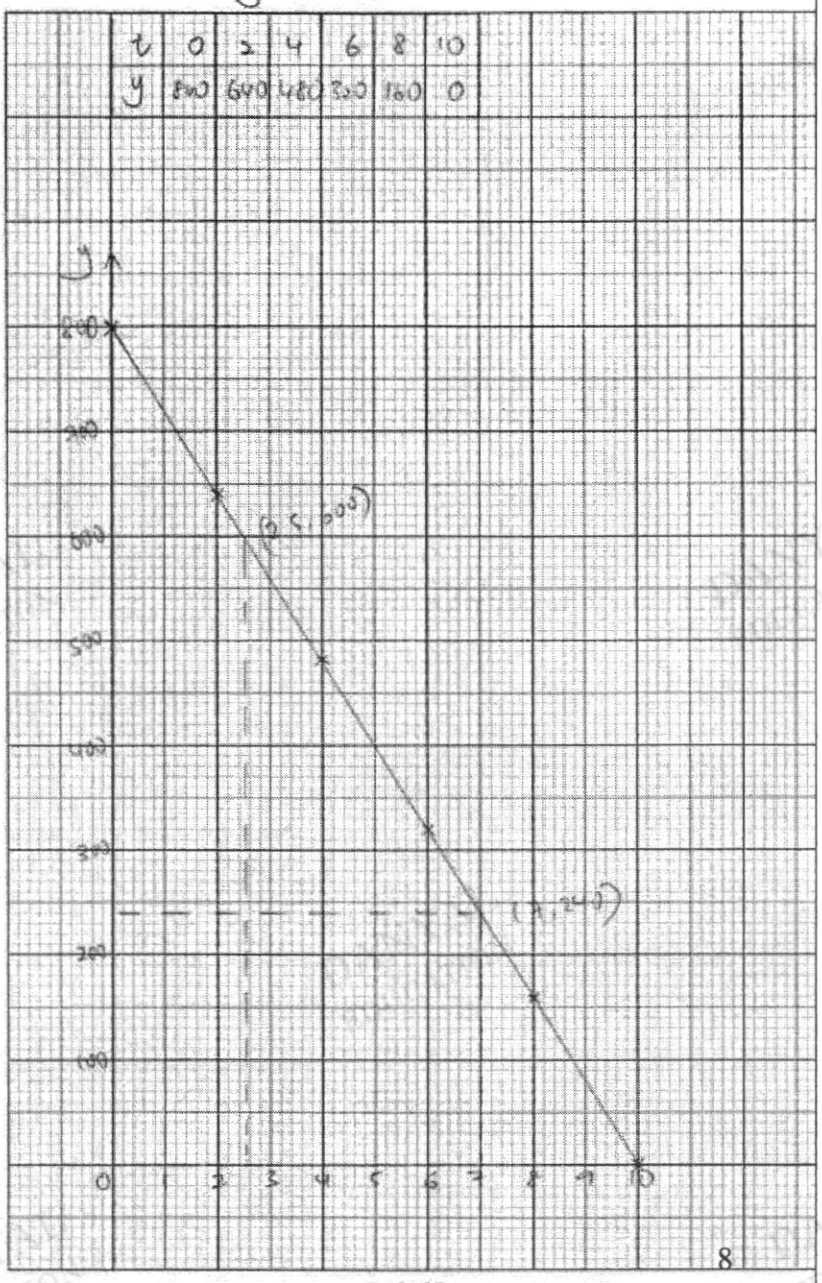
8c	$\frac{750}{m}=\frac{2\times3\times5^3}{2\times3}$ $m=2\times3$ $=6$	B1
8d	45	B1
9a	\$1860	B1
9b	Price in Nov $=1860\times92\%$ $=\$1711.20$ Percentage change $=\frac{1711.20-1500}{1500}\times100\%$ $=14.08\%$	M1 M1 A1
10a	$4a-3(b-5a)$ $=4a-3b+15a$ $=19a-3b$	M1 A1
10b	$\frac{2c+1}{3}+\frac{1-c}{4}$ $=\frac{4(2c+1)+3(1-c)}{12}$ $=\frac{8c+4+3-3c}{12}$ $=\frac{5c+7}{12}$	M1 A1

11a	$2(3x+5)+7(x+2)=-2$ $6x+10+7x+14=-2$ $13x=-26$ $x=-2$	M1 A1
11b	$\frac{2}{1-3y}=\frac{8}{5y+3}$ $2(5y+3)=8(1-3y)$ $10y+6=8-24y$ $34y=2$ $y=\frac{2}{34}$ $=\frac{1}{17}$	 M1 A1
12a	$\angle ADC=180-112$ (int $\angle$s, AD//BC) $=68°$ reflex$\angle ADC=360-68$ ($\angle$s at a pt) $=292°$	M1 A1
12b	$\angle CAB=40°$ (alt $\angle$s, AB//CD) $\angle ABD=66-40$ (ext $\angle$ of) $=26°$	M1 A1
13a	Perimeter $=24+20+20+24+20$ $=108$ cm	 B1

13b	$\frac{1}{2}\times 20\times h = 160$ $h = 16$		B1
13c	Area $= \frac{24}{100}\times\frac{16}{100}$ $= 0.0384\ \text{m}^2$	Area $= 24\times 16 \div 10000$ $= 0.0384\ \text{m}^2$	M1 – for 24 x 16 A1
Section 2			
14a			**B1** for Point *C* with construction line (1 arc) **B1** for Point *C* with construction lines (2 arcs) **B1** for Point *P* with construction lines (2 arcs)

14b	$9.7 \pm 0.2\text{cm}$		B1
14c	On Graph		B1
14d	$99 \pm 1°$		B1
15a	Exterior angle $= 180 \div 6$ $= 30°$ $n = \frac{360}{30}$ $= 12$		M1 A1
15b	Interior angle of pentagon $= \frac{(5-2)\times 180}{5}$ $= 108°$ $\angle ABC = 360 - 108 - 108$ ($\angle$s at a pt) $= 144°$	$\angle ABC = \frac{360}{5} \times 2$ $= 144°$	 M1 A1
15c	$(n-2)180 = n \times 144$ $180n - 144n = 360$ $36n = 360$ $n = 10$ Number of sides = 10		M1 A1

16a	$22.5\text{m/s}=\frac{22.5\text{m}}{1\text{s}}$ $=\frac{\frac{22.5}{1000}\text{km}}{\frac{1}{3600}h}$ or $\frac{22.5\times60\times60}{1000}$ $=81\text{km/h}$	M1 A1
16bi	Total time taken $=\frac{15}{3}\times15$ $=75\text{mins}$ $=1\frac{1}{4}h$	M1 A1
16bii	1210	B1
16c	Distance $=81\times1\frac{1}{4}$ $=101\frac{1}{4}km$	M1 (ecf on (a) and (bi)) A1
17a	480	B1

17b	$y = 800 - 8t$ ¹⁶  8 **End of Paper**	P1 – 5 points L1 - passes through at least 3 points

17c	240m		B1
17d	2.5 min		B1
17e	-80		B1
17f	Gradient represent the walking **speed** of Ken.		B1
18a	Area $=\frac{1}{2}\times(6+12)\times 4\times 2$ $=72\text{cm}^2$		M1 (for 1 trapezium shown - 36cm^2) A1
18b	Volume $=72\times 7$ $=504\text{cm}^3$		DB1
18c	$\pi\times 5^2\times h=504$ $h=\frac{504}{\pi\times 5^2}$ $=6.417$ $=6.42$ cm(3 sig fig)	$3.142\times 5^2\times h=504$ $h=\frac{504}{3.142\times 5^2}$ $=6\frac{654}{1571}\text{cm}$	M1 (ecf) A1
18d	Surface area	Surface area $=2(3.142)(5^2)+2(3.142)(5)(6\frac{654}{1571})$ $=358.7\text{cm}^2$	M1 (ecf) M1

	$= 2\pi(5^2) + 2\pi(5)(6.417)$ $= 358.6$ $= 359\text{cm}^2$ (3 sig fig) Cost $= 358.6 \times 0.45$ $= \$161.37$ $= \$161$ (nearest dollar)	Cost $= 358.7 \times 0.45$ $= \$161.415$ $= \$161$ (nearest dollar)	A1
19a	Total amount $= [1249 + (24.90 \times 12)] \times 1.07$ $= 1656.146$ $= \$1656.15$ (2dp)		M1 A1
19b	Total amount $= (1249 \times 1.07 \times 0.9) + (20 \times 12 \times 1.07)$ $= 1459.587$ $= \$1459.59$ (2dp)		M1 A1
19c	Company Y Total amount $= [18 + (100 \times 0.04)] \times 1.07$ $= \$23.54$ Company Z Total amount	Company Y Total amount $= 18 + (100 \times 0.04)$ $= \$22$ Company Z Total amount	B1

	$=[17.90+(80\times0.02)]\times1.07$ $=20.865$ $=\$20.87$ (2dp) Mrs Lim should choose Company Z	$=17.90+(80\times0.02)$ $=\$19.50$ Mrs Lim should choose Company Z	B1 DB1

11