XMS 2018 EOY 1E

Section A (40 marks)

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

1. Evaluate
$$\sqrt[3]{\frac{(-71.9)^4}{406^2 + (-23.5)^3}}$$
 and correct your answer to 4 significant figures.

Answer[1]



3. Write down, from the following list,

$$\sqrt{7}$$
, 1.4, $\sqrt{4}$, 1, $\sqrt[3]{-27}$

(a) the prime number(s),

Answer (a)[1]

(**b**) the rational number(s).

Answer (b)[1]

4. Consider the sequence -20, -13, -6, 1, 8,

(a) Write down, in terms of n, a formula for the n^{th} term of the sequence.

Answer (*a*)[1]

(b) Hence explain why 100 is not a term in the sequence. Show your working clearly. *Answer*

.....

.....

.....

- 5. It is given that $a = 2^5 \times 5^2 \times 7$ and $b = 2 \times 5^3 \times 7^2$.
 - (a) Find the highest common factor of *a* and *b*.

Answer (a)[1]

(b) Find the smallest positive integer *m* such that *am* is a perfect cube.

Answer (*b*) *m* =[1]



Answer (b)[1]

[Turn over

- 7. A cyclist starts cycling at a speed of 120 m/min at 9.15 am.
 - (a) Convert 120 m/min into km/h.

Answer (*a*) km/h [1]

(**b**) If the cyclist increases his speed by 0.8 km/h, he would be able to complete his journey at 10.45 am. Find the distance covered by the cyclist.

Answer (*b*) km [1]

8. Given that 2a = 3b and b: c = 4:5, find a: c.

9. The width of a rectangle is x cm and the length is 2x cm. If the length is increased by 10% and the width is decreased by 20%, determine if there is a percentage increase or decrease in the area of the rectangle and find this percentage.

Answer There is a percentage%. [3]

10. Solve $-\frac{2x-5}{7} + x = \frac{x-2}{4}$.

Answer $x = \dots$ [3]

11. Three alarms sound at regular intervals of 12 seconds, 45 seconds and 60 seconds respectively. If all three sound together at 8.30 am, find the total number of times they will sound together by 9.45 am.

Answer[3]

12. (a) Factorise $3a^2mn - 6a^3m^2n$ completely.

Answer (*a*)[1]

(b) Expand and simplify $\frac{1}{3} [12 - 3(2 - x)] - 5x$.

Answer (*b*)[2]

13. (a) The diagram below shows a parallelogram. Find the value of *h*.



(b) The area of the trapezium shown below is 240 cm². Given that AE = 12 cm and AB = 14 cm, find the length of *CD*.



Answer (*b*) *CD* = cm [2]

[Turn over

14. (a) It is given that $a[6-a(p+3)] = p(a^2+4)$. Without using the calculator and showing your working clearly, find the value of p when a = -2.

Answer (*a*) *p* =[2]

(b) In the diagram below, *ABCD* is a rhombus. It is given that $\angle ABC = 116^{\circ}$. Find $\angle ACD$.



Answer (b)
$$\angle ACD = \dots$$
 [2]

15. (a) The interior angle of a regular *n*-gon is 144° . Find the value of *n*.

Answer (*a*) $n = \dots [2]$

(b) A polygon has four interior angles each of size 152°, six exterior angles each of size 23° and the remaining exterior angles are each of size 22°.
Find the number of sides of the polygon.

Answer (b) [3]

Section B (40 marks)

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

Chargeable Income	Income Tax Rate (%)	Gross Tax Payable (\$)
First \$20,000	0	0
Next \$10,000	2	200
First \$30,000 Next \$10,000	3.50	200 350
First \$40,000	-	550
Next \$40,000	7	2,800
First \$80,000	-	3,350
Next \$40,000	11.5	4,600
First \$120,000	-	7,950
Next \$40,000	15	6,000

16. The table below shows part of the income tax rates in Singapore for the year 2017.

In 2017, Mr Tan earned a gross annual income of \$110 400.

He was eligible for the following relief: personal relief of \$3500, a wife relief of \$2000, a child relief of \$4200 for each child, CPF contributions of \$23 000 and donation of \$1500 to charitable organisations.

Based on the income tax above, find his income tax payable for the year 2017 if he is married with 2 children. [2]

17. In the diagram below, AB // CE. AE is the angle bisector of $\angle BAD$.



(a) Find $\angle ACE$.

[2]

[2]

(b) Show that $\triangle ADE$ is an isosceles triangle. Explain your answer clearly.

[Turn over

- **18.** The pie chart below shows the distribution of people of different age groups who visited the library on a certain day. Given that 35% of those who visited the library are youth, find
 - (a) the value of x, [2]

[2]

(b) the total number of people who visited the library if the number of adults is 130 more than the number of young children.



- **19.** Thomas took part in a competition. He cycled *x* km at an average speed of 36 km/h and ran the remaining distance at an average speed of 9 km/h. The entire 102-km journey took Thomas 4 hours to complete.
 - (a) Form an equation in x and show that x = 88. [3]
 - (b) Find, in hours, the time that he ran. [1]

20.	. Using the line XY below, construct ΔXYZ such that $XY = 10$ cm, $YZ = 9$ cm and		
	XZ = 8.6 cm.	[1]	
	(a) Measure and write down the size of $\angle YXZ$.	[1]	
	-(b) Construct the perpendicular bisector of YZ.	[1]	
	-(c) Construct the angle bisector of -∠XZY	[1]	
	(d) The point <i>P</i> is such that it is equidistant from <i>Y</i> and <i>Z</i> , and equidistant from		
	— XZ and YZ.		
	(i) Label P.	<u>[1]</u>	
	(ii) Measure and write down the length of YP.	[1]	

- 21. The figure below shows an open triangular prism of volume 12.6 litres and height 30 cm filled to the brim with water from a cylindrical pipe.The pipe of diameter 3 cm discharges water at a rate of 2.25 m/s.
 - (a) Find the time taken for the prism container to be filled to the brim, correct to the

nearest second.

[2]

The cross-section of the prism container is an isosceles triangle such that AF = FB = 29 cm and FG = 20 cm.

- **(b)** Show that AB = 42 cm. [2]
- (c) Find the surface area of the prism container in contact with the water. [3]



Write your answer for the whole of question 21 on the next page.

Write your answer for the whole of question 21 on this page.

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

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

x	- 2	0	1	4
у	а	4	2	- 4

The	e relationship between x and y can be expressed as $y = 4 - 2x$.	
(a)	Find the value of <i>a</i> .	[1]
(b)	Using 2 cm to represent 1 unit on the x-axis and 1 cm to represent 1 unit on	
	the y-axis, draw the graph of $y = 4 - 2x$, using the values in the above table.	[2]
(c)	Use your graph to find	
	(i) the coordinates of the point at which the graph cuts the x-axis,	[1]
	(ii) the value of m given that the point $(m, 1)$ lies on the graph.	[1]
(d)	The line $x = 3$ cuts the graph at point <i>P</i> .	
	(i) Draw the graph of $x = 3$.	[1]
	(ii) Hence, state the coordinates of <i>P</i> .	[1]

23. Eric plans to buy a branded bag for his wife as an anniversary gift. He is deciding between the local advertisement he saw for the Preda bag sold in Isten Shopping Centre and the direct US website for Preda bag.

The information for both the local advertisment and the website are provided on the next page.

- (a) Calculate the total amount Eric would pay for the Preda bag if he is to buy it from Isten Shopping Centre.
- (**b**) Suggest whether Eric should buy the Preda bag from Isten Shopping Centre or the direct US website.

Justify your choice with appropriate calculations.

[US\$1 = S\$1.34] [4]

[2]



US Website



END OF PAPER

<u>Answer Key</u> 1. 5.604			
2a. <i>x</i> < 6	2b. 4		
3a. $\sqrt{4}$	3b. $1.4, \sqrt{4}, 1, \sqrt[3]{-27}$		
4a. 7 <i>n</i> – 27			
5a. 350	5b. 490		
6a. $\frac{1}{2}$	6b. $y = \frac{1}{2}x + 4$		
7a. 7.2 km/h	7b. 12 km		
8.6:5			
9. decrease ; 12 %			
10. $x = -2\frac{8}{13}$			
11. 25 or 26			
12a. $3a^2mn(1-2am)$	12b. $2-4x$		
13a. $h = 7.5$	13b. 26 cm		
14a. $p = -2$	14b. 32°		
15a. <i>n</i> = 10	15b. 15		
16. \$2790			
17a. 52°			
18a. $x = 39$	18b. 600		
19b. $1\frac{5}{9}$ hours			
20a. 8s	20c. 3420 cm ²		
21a. <i>a</i> = 8	21ci. (2,0)	21cii. <i>m</i> =1.5	21dii. (3,-2)
22a. $\angle YXZ = 58^{\circ} [\pm$	1°] 20dii. $PY = 5$.5cm [±0.1cm]	
23a. S\$6020	23b. Isten Shopping	Centre	