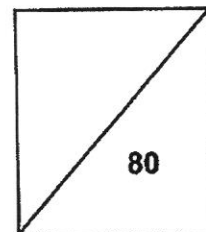# NORTH VISTA SECONDARY SCHOOL

END-OF-YEAR EXAMINATION 2020

80

NAME: _____ (   )   CLASS: _____

SUBJECT: MATHEMATICS   DATE: 30 SEPTEMBER 2020

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** the 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 **19** printed pages.

[Turn over

2

Section 1
Answer **all** the questions

1 Consider the following numbers.

$$1 \, , \, \frac{22}{7} \, , \, \sqrt[3]{-27} \, , \, -5\frac{1}{8} \, , \, \pi \, , \, 0.\dot{3} \, , \, \sqrt{5} \, , \, 5$$

Write down

(a) the integer(s),

Answer .... [1]

(b) the irrational number(s),

Answer .... [1]

(c) the prime number(s).

Answer .... [1]

---

2 **(a)** Calculate $\dfrac{\pi - 6.2^2}{\sqrt[3]{20} - 3\frac{6}{7}}$, write down the first six digits shown on your calculator display.
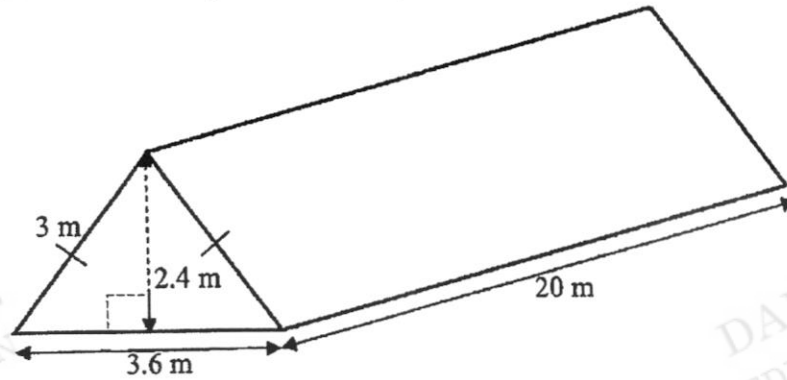
Answer .... [1]

(b) Give your answer to **part (a)** correct to 4 significant figures.

Answer .... [1]

3

3   The diagram shows a prism whose cross-section is an isosceles triangle.
    All dimensions are given in **metres**.
    Calculate the volume of the prism and leave your answers in **cm³**.

Answer .... cm³   [2]

4   A cylindrical pipe with diameter 3.2 cm discharges water at a rate of 360 cm/s.
    Find the volume of water discharged in 30 seconds, giving your answer to the
    nearest cm³.

Answer .... cm³   [2]

5   Mr Yee sold his private property and earned a 30% profit.
    If the profit earned is $350 400, find the cost price of the property.

Answer $ ....   [2]

4

6 Three of the interior angles of an n-sided polygon are 156°, 117° and 135°, and the remaining interior angles are 123° each.
Find the value of n.

Answer $n =$ .... [3]

---

7 Mrs Eliza is $(15x-6)$ years old. She is thrice as old as her daughter, Beth.
Find the age of Mrs Eliza, in terms of x, when she gave birth to Beth.

Answer .... years old [3]

5

8 (a) The interior angle of a regular polygon is 162°.
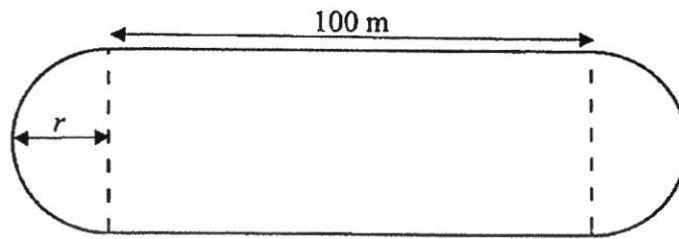Calculate the number of sides that the polygon has.

Answer .... [2]

(b) Calculate the exterior angle of a regular pentagon.

Answer .... [1]

6

9 The diagram below shows a school field made up of a rectangle and two semi-circles.

(a) Given the perimeter of the field is 400 m, find in terms of π, the radius, r, of the semi-circle.

Answer .... m   [2]

(b) Hence, find the area of the field leaving your answers correct to the nearest m^2.

Answer .... m^2 [2]

7

10   *ABCE* is a parallelogram, angle *a* = angle *b* = angle *c* and angle *BCD* is 51°.
Stating your reasons clearly, find
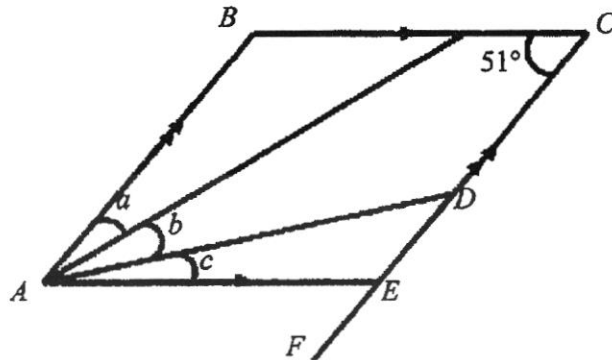
(a) angle *ABC*,

Answer   Angle ABC = ... [1]

(b) angle *AEF*,

Answer   Angle AEF = ... [1]

(c) angle *ADE*.

Answer   Angle ADE = ... [2]

8

11 The numbers p and q, written as the products of their prime factors are
$p = 2^4 \times 3^3 \times 7$ and $q = 2^2 \times 7^2 \times 11^6$.

(a) Find
   (i) the greatest whole number that will divide both p and q exactly.

Answer .... [1]

   (ii) their LCM, leaving your answer as a product of its prime factor.

Answer LCM = ... [1]

(b) Explain with working, if pq is a perfect cube.

Answer ....

....

....

....

.... [2]

9

12 Hannah took a flight at 0935 from Singapore to Dubai, then took the next available flight from Dubai to Geneva.
The table below shows the flight duration and distance.

	Duration	Distance (km)
Singapore to Dubai	7 h 30 min	5 842
Dubai to Geneva	7 h 5 min	4 924

(a) If it took her 16 h 10 min to reach Geneva from Singapore, how long did Hannah wait for her next flight at Dubai airport?

Answer .... [1]

(b) Hannah reached Geneva on the same day at 1845 local time.
Determine the time difference between Singapore and Geneva.

Answer .... [1]

(c) Calculate the average speed for the entire flight journey.
Leave your answer to the nearest km/h.

Answer .... km/h [2]

13 Solve the following equations.

(a) $3.5x - 0.7 = 2x + 9.8$

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

(b) $\dfrac{7y-3}{9y-5} = \dfrac{2}{3}$

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

11

Section 2
Answer all the questions

14 The first three figures of a sequence are as shown.
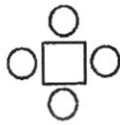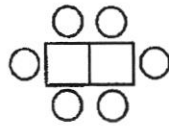

Figure 1   Figure 2   Figure 3

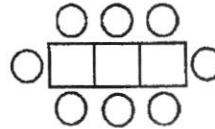(a) Complete the table.   [1]

Answer

Figure	No. of squares	No. of circles
1	1	4
2	2	6
3	3	8
4		
5		

(b) Find an expression, in terms of *n*, for the number of circles in Figure *n*.

Answer .... [1]

(c) Find the number of circles in Figure 78.

Answer .... [1]

(d) Will there be a pattern with a total of 601 circles? Explain your answer.

Answer..

....

....

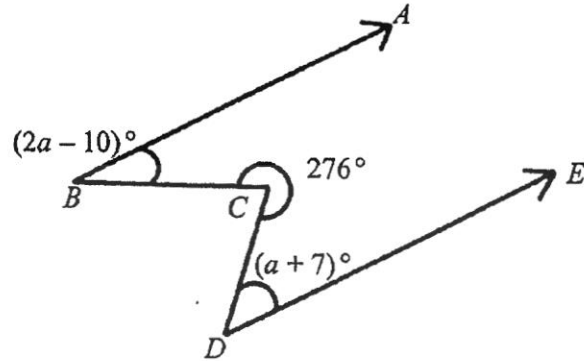... [1]

12

15 **Stating your reasons clearly**, find the value of the unknown in the following figure.

Answer $a =$ .... [4]

13

16 The number of pets each of the three friends Rei, Ian and Luke owns, is shown in the pictogram below.
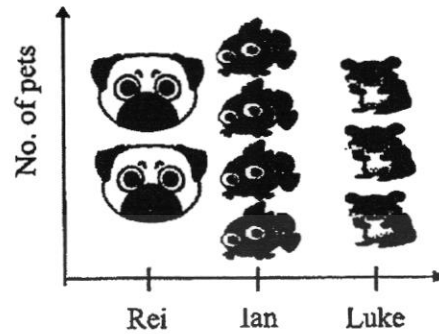
(a) State one feature of the graph that may be misleading.

Answer ....

....

....

.... [1]

(b) Would it be better to present the above information with a line graph? Explain your answer.

Answer ....

....

....

.... [1]

(c) Rei decided to represent the above information using a pie chart.
If each animal represent 3 pets owned by a friend, find the angle of the sector that represent Rei's number of pets.

Answer .... [2]

14

17 **(a)** Construct a quadrilateral *JKLM* such that *KL* = 7 cm, *JM* = 10cm, [3]
angle *JKL* = 110° and angle *MJK* = 80°.
JK has already been drawn.

Answer

J _____ K

(b) Measure and write down the length of *LM*.

Answer   *LM* = ... [1]

15

18   Wei Kang wanted to buy a 55–inch OLED TV for his new house. He had two
     options as shown below:

Option 1	Cash: $3580
Option 2	Hire Purchase:
	Deposit of 15% of cash price plus
	2 years of monthly payment at an interest of 8% per annum.

(a) Calculate his monthly instalment if he choose Option 2.

Answer $ .... [3]

(b) How much would he save if he choose Option 1 instead?

Answer $ .... [1]

16

19 Lucas planned to save a certain amount of money in one week to buy a toy figurine.
    He saved some money every day, starting Monday.
    The ratio of the amount of money he saved on Monday to the amount he saved for
    the rest of the days (Tuesday to Sunday) is 1 : 5.
    After he saved another $8.20 on Tuesday, he was 70% away from his targeted
    amount.
    For the rest of the week, he saved the same amount of money every day.

    (a) Find the amount he targeted to save.

    Answer $ .... [2]

    (b) Calculate the amount of money he saved every day for the rest of the week.

    Answer $ .... [2]

    (c) After a week, he happily took the saved amount of money to buy the toy
        figurine. But the price of the toy figurine had changed. The cashier showed him
        a balance of –$3.40 after he had paid the amount using all his savings.
        Find the price of the toy figurine.

    Answer $ .... [2]

20 **(a)** Factorize $-11ax - 33ay - 22az$ completely.

Answer .... [1]

(b) It is given that $s = ut + \dfrac{1}{2}at^2$.

Find s when $u = \dfrac{1}{5}$, $a = 0.25$ and $t = 16$.

Answer $s =$ .... [1]

(c) Simplify the following expressions.

(i) $3(9x - 5y) - 7(-2y + x)$,

Answer .... [2]

(ii) $\dfrac{13x+1}{6} + \dfrac{4-8x}{9}$.

Answer .... [2]

18

21 Samuel plans to purchase and paint the surface of the wooden stools shown below.
Stool A has a **uniform** cross-sectional area and **Stool B** is made up of one
cylindrical seat and four identical cylindrical legs.
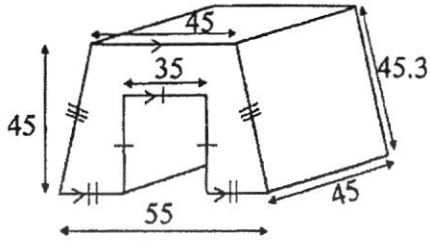
Stool A
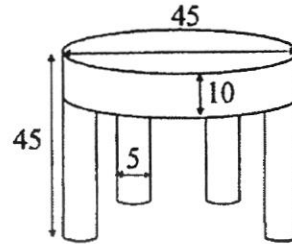
Stool B

(a) Leaving your answers to the nearest cm^2,
find the total surface areas of

(i) Stool A,

Answer ....cm^2 [3]

(ii) Stool B.

....cm^2 [3]

19

(b) A can of paint cost $2.33.

Each can of paint covers an area of 600 cm^2.
Will he have enough money to paint both stools if he has $80?
Justify your answer with working.

Answer ....

....

....

....

.... **[2]**

End of Paper
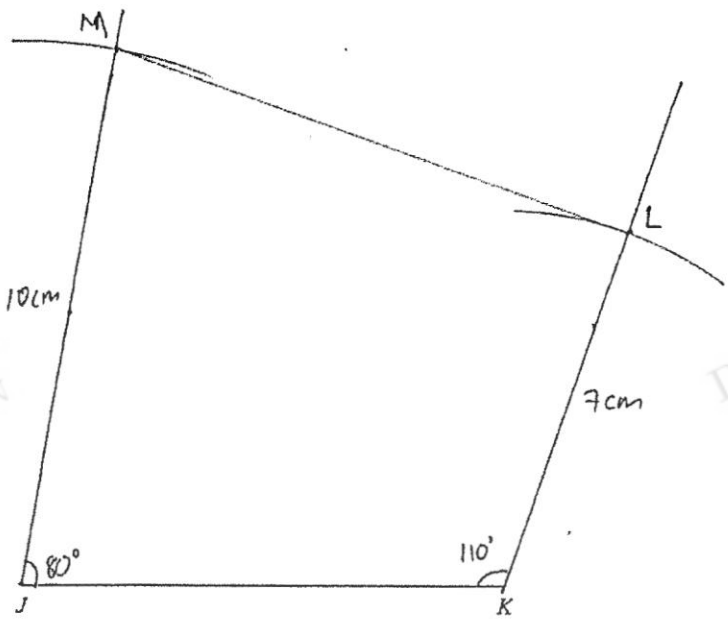
Sec 1E EOY EXAM 2020 Mark Scheme

Section 1

	Answer	Marking Scheme
1 (a)	$1, \sqrt[3]{-27}, 5$	B1
(b)	$\pi, \sqrt{5}$	B1
(c)	5	B1
2 (a)	30.8896	B1
(b)	30.89	B1
3	$\frac{1}{2} \times 3.6 \times 2.4 \times 20 = 86.4 \, \text{m}^3$ $= 84\,400\,000 \, \text{cm}^3$	M1 A1
4	$\pi \times 1.6^2 \times 360 \times 30 = 86\,859 \, \text{cm}^3$ Or $\pi \times 1.6^2 = 8.0424$ $8.0424 \times 360 \times 30 = 86\,857.92 = 86\,858 \, \text{cm}^3$	M1, A1 M1, A1
5	$350400 \div 30 \times 100 = \$ \, 1\,168\,000$	M1, A1
6	$(n-2) \times 180 = 156 + 117 + 135 + 123(n-3)$ $180n - 360 = 408 + 123n - 369$ $57n = 399$ $n = 7$	M1 M1 A1
7	Beth $= (5x - 2)$ years old. $(15x - 6) - (5x - 2)$ $15x - 6 - 5x + 2$ $= (10x - 4)$ years old.	M1 M1 A1
8 (a)	Exterior angle $= 180° - 162° = 18°$ No of sides $= 360 \div 18 = 20$ Or $\frac{(n-2)180}{n} = 162°$ $180n - 162n = 360°$ $n = 20$	M1 A1 M1 A1

(b)	$360 \div 5 = 72°$	B1
9 (a)	$2\pi r + 200 = 400$ $r = \dfrac{100}{\pi}$ m	M1 A1
(b)	$\pi(\dfrac{100}{\pi})^2 + 100 \times 2(\dfrac{100}{\pi})$ $= 9549$ m^2	M1 A1
10 (a)	Angle $ABC = 180° - 51° = 129°$ (Int angels, AB//FC)	B1
(b)	Angle $AEF = 51°$ (Corr angles, BC//AE)	B1
(c)	Angle $c = 17°$ Angle $ADE = 51° - 17° = 34°$ (ext angle of triangle)	M1 A1
11(a)(i)	HCF $= 2^2 \times 7 = 28$	B1
(ii)	LCM $= 2^4 \times 3^3 \times 7^2 \times 11^6$	B1
(b)	$pq = 2^6 \times 3^3 \times 7^3 \times 11^6$ Since all the index of its prime factors are multiples of 3, pq is a perfect cube.	M1 A1
12(a)	1 h 35 min or 95 min	B1
(b)	7 hours	B1
(c)	$\dfrac{5842 + 4924}{16\dfrac{10}{60}} = 666$km/h	M1 A1
13(a)	$1.5x = 10.5$ $x = 7$	M1 A1
(b)	$3(7y - 3) = 2(9y - 5)$ $21y - 9 = 18y - 10$ $y = -\dfrac{1}{3}$	M1 A1

Section 2			
14(a)			B1

Figure	No. of squares	No. of circles
4	4	10
5	5	12

(b)	$2n + 2$	B1

(c)	158	B1

(d)	No. This is because the number of circles will always be even numbers whereas 601 is an odd number.	B1

15	$a1 = 2a - 10$ (alt angles, //lines) $a2 = a + 7$ (alt angles, //lines) $2a - 10 + a + 7 + 276 = 360$ (angles at a point) $a = 29$	M1 M1 M1 A1

16(a)	It is not clear if the height or the area of each picture is to be used in comparing the number of pets. Legend / Key is not given for comparison. Accepted: Students mention height / size of pets/picture/icon/image Not accepted: Students just write 'size'	B1
(b)	No. This is because line graph is used to observe the rising or falling of a trend. The line graph is used to plot the data <u>over time</u>.	B1
(c)	$\dfrac{2}{9} \times 360° = 80°$	M1, A1

3

17(a)	 B1 – JM with correct angle and length B1 – KL with correct angle and length B1 – Join M to L to form quad JKLM with correct labelling Deduct 1m for lack of construction lines	B3
(b)	$LM = (10.1 \pm 0.1)$ cm	B1
18(a)	$3580 \times 85\% = \$3043$ $3043 \times \dfrac{8}{100} \times 2 = \$486.88$ $(486.88 + 3043) \div 24 = \$147.08$	M1 M1 A1
(b)	$486.88	B1
19 (a)	$\dfrac{3}{10} - \dfrac{1}{6} = \dfrac{2}{15}$ rep $8.20 Total amount $= 8.2 \div 2 \times 15 = \$61.50$	M1 A1
(b)	$\dfrac{1}{6} \times 61.50 = 10.25$ $(61.5 - 10.25 - 8.2) \div 5 = \$8.61$	M1 (ECF) A1
(c)	$\$61.50 - (- \$3.40) = \$64.90$	M1 (ECF), A1

4

20(a)	$-11a(x+3y+2z)$ or $11a(-x-3y-2z)$	B1
(b)	35.2 or $35\frac{1}{5}$	B1
(c)(i)	$27x-15y+14y-7x$ $=20x-y$	M1 A1
(ii)	$\dfrac{3(13x+1)+2(4-8x)}{18}$ $=\dfrac{39x+3+8-16x}{18}$ $=\dfrac{23x+11}{18}$	M1 A1
21(a)(i)	**Stool A** $=\{2[\frac{1}{2}\times(45+55)\times45]-(35\times35)\}+45(45+45.3+55+45.3+35+35)$ $=13\,777$ cm^2	M1 for cross-sectional area M1 for the lateral area A1
(ii)	**Stool B** $=2\pi(\frac{45}{2})^2+2\pi(\frac{45}{2})(10)+2\pi(\frac{5}{2})(35)\times4$ $=6\,794$ cm^2	M1 for cross-sectional area M1 for the lateral area A1
(b)	$(13\,777+6794)\div600=34.285=35$ cans $35\times2.33=\$81.55$ He will not have enough money for the paint. Accept if students calculated the amount of paint that can be bought with \$80 (20400m^2) and make comparison with the area found in part (a), and state the conclusion. Deduct 1m from question if students calculated without both label and units (resulting in marker having to decipher what student is finding through just numbers alone).	M1 (ECF) A1 (Dependent)

5