STUDENT'S NAME: _____

TEACHER'S NAME: _____

2019 **YEARLY EXAMINATION**

Year 10 Mathematics

Examiners **Mr G Rawson, Mrs D Crancher, Mr S Faulds, Ms L Yuen, Ms M Sabah,**

General Instructions

- Time Allowed: 80 minutes + 3 minutes reading time
- Write using **black or blue** pen
- NESA-approved calculators may be used

Total Marks: 80

Section I (Multiple-Choice questions**) – 20 marks**

- Answer on the **separate Answer Sheet provided** at the back of this paper
- Attempt Questions 1 – 20

Section II (Extended Response questions) – **60 marks**

- Answers/working out is to be written in the space provided for each question
- **Part A**: Attempt Questions 21 – 29
- **Part B**: Attempt Questions 30 – 38
- **Part C**: Attempt Questions 39 – 47
- **Part D**: Attempt Questions 48 – 55

SECTION	Part A	Part B	Part C	Part D	
	See yearly examination notification for details				
I	/5	/5	/5	/5	
II	/15	/15	/15	/15	
Total	/20	/20	/20	/20	/80

Section I: Multiple Choice

20 Marks
Attempt Questions 1 - 20
Allow about 20 minutes for this section

Use the **Multiple Choice Answer Sheet** provided for Questions 1 – 20.

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1. What is the total surface area of a cube of side length 5 cm?

(A) 25 cm^2 (B) 125 cm^2

(C) 100 cm^2 (D) 150 cm^2

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2. What is the exact exterior surface area of a hose (cylinder opened at both ends), which has diameter of 15 mm and a length of 20 m?

(A) 600π mm^2 (B) 300 000 mm^2

(C) $300\,000\pi$ mm^2 (D) $600\,000\pi$ mm^2

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3. A sphere has a volume of 3053 mm^3.
What is its radius, correct to the nearest cm?

(A) 3 cm (B) 6 cm

(C) 9 cm (D) 12 cm

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4. What is the surface area of a sphere of diameter 12 cm, correct to the nearest cm^2?

(A) 452 cm^2 (B) 1810 cm^2

(C) 1421 cm^2 (D) 5685 cm^2

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5. An Egyptian pyramid has a square base 90 m long and is 40 m high.
What is its volume?

(A) 108 000 m^3 (B) 180 000 m^3

(C) 270 000 m^3 (D) 324 000 m^3

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6. Alan is five times the age of his son, Tom. In 6 years, he will be three times the age of Tom. How old is Tom now?

(A) 6 years
(B) 8 years
(C) 11 years
(D) 12 years

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7. What is the gradient of the line with equation $4x + 2y - 7 = 0$?

(A) -2
(B) $-\frac{1}{2}$
(C) $\frac{1}{2}$
(D) 2

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8. Which of the following is the expansion of $\left(4+\sqrt{10}\right)^2$?

(A) 26
(B) $26+4\sqrt{10}$
(C) $26+8\sqrt{10}$
(D) $116+4\sqrt{10}$

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9. Simplify $\sqrt{45}-2\sqrt{5}$

(A) $\sqrt{5}$
(B) $\sqrt{35}$
(C) $7\sqrt{5}$
(D) $4\sqrt{10}$

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10. Simplify $\frac{28u^5y^2}{8u^2y^2}$

(A) $7u^3$
(B) $\frac{7u^3}{2}$
(C) $\frac{7u^3y}{2}$
(D) $7u^3y$

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11. A box contains 5 balls. Two of them are red and the rest are green.
If 2 balls are chosen at random without replacement, what is the probability that at least one of them is red?

(A) $\frac{3}{10}$ (B) $\frac{2}{5}$

(C) $\frac{7}{10}$ (D) $\frac{9}{10}$

12. If a fair dice is thrown, what is the probability that the number is a prime number given that an odd number shows up?

(A) $\frac{1}{6}$ (B) $\frac{1}{3}$

(C) $\frac{1}{2}$ (D) $\frac{2}{3}$

13. The mean and the standard deviation of a group of 10 numbers are 15 and 4 respectively. When two numbers, each of which are 15 are added, what should be the new mean and the new standard deviation?

(A) mean = 15, standard deviation > 4 (B) mean = 15, standard deviation < 4

(C) mean > 15, standard deviation > 4 (D) mean < 15, standard deviation < 4

14. The experimental probability of getting a head when a certain coin is tossed is 0.6. The coin was tossed 200 times. If 55 heads showed up in the first 80 tosses, how many heads showed up in the remaining 120 tosses?

(A) 55 (B) 60 (C) 65 (D) 70

15. The stem-and-leaf diagram below shows the heights (in cm) of 10 trees.

Stem (10 cm)	***Leaf (1 cm)***
40	1 1 2
41	2 3 8
42	3 4 7 7

What is the standard deviation of the heights?

(A) 2.5 cm (B) 10.1 cm (C) 12.8 cm (D) 25.3 cm

16. Which of the following is the expansion of $(3x+2)(x-5)$?

(A) $3x^2-13x-10$ (B) $3x^2+13x-10$

(C) $3x^2-13x+10$ (D) $3x^2+13x+10$

17. Which of the following represents the solutions to the equation $(2x-8)(x+3)=0$?

(A) $x=-8,\ x=3$ (B) $x=4,\ x=-3$

(C) $x=4,\ x=3$ (D) $x=8,\ x=-3$

18. Which of the following represents the simplest factorised form of the equation $9x^2-4$?

(A) $(9x-4)(9x+4)$ (B) $(3x-2)^2$

(C) $(3x+2)^2$ (D) $(3x+2)(3x-2)$

19. Which of the following represents the solution to the equation $(x+5)^2=3$?

(A) $x=5+\sqrt{3}$ (B) $x=-5\pm\sqrt{3}$

(C) $x=-5\pm 3$ (D) $x=5\pm\sqrt{3}$

20. The quadratic formula gives the solutions to equations of the form $ax^2+bx+c=0$.

In order to solve $3-x+2x^2=0$ using the quadratic formula, which of the following represent the respective values for a, b and c ?

(A) 3, –1 and 2 (B) 2, –1 and 3

(C) 2, 1 and 3 (D) 2, $-x$ and 3

End of Section I ~ Multiple Choice

Section II: Extended Response

Part A:

15 Marks
Attempt Questions 21 - 29
Allow about 15 minutes for this part

Write your answer in the spaces provided for each question.
ONE mark questions **do not** require working out.

Question 21	**Marks**
A company manufactures two sizes of steel balls. The diameter of the larger ball is 4 times the diameter of the smaller ball. How many small balls can be made from the steel in the larger ball?	**1**

Question 22	**Marks**
Find the volume of a cone with base radius 5cm and perpendicular height 14cm. (Give your answer correct to 2 decimal places.)	**1**

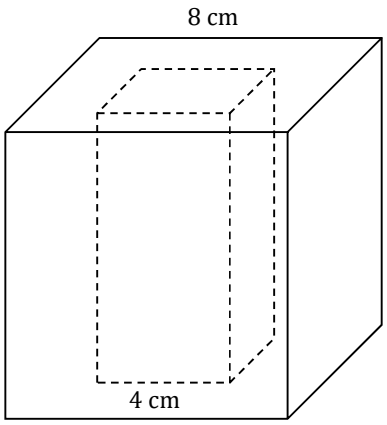
Question 23	**Marks**
Find the volume of a sphere with a radius of $2 \cdot 5$m (Give your answer correct to 2 decimal places.)	**1**

Question 24 — Marks

An 8 cm cube has a 4 cm square hole cut through it. **1**

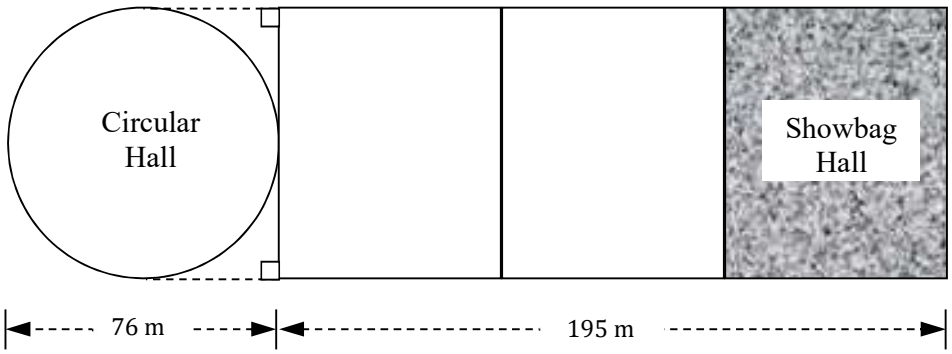
Calculate the *remaining* volume.

Diagram not to scale



Question 25 — Marks

The diagram shows four halls at a showground. **1**



The diameter of the circular hall is 76 metres.
The three rectangular halls are equal in size and their total length is 195 metres.

Calculate the area of the showbag hall, in square metres.

Question 26 — Marks

Find the total surface area of the following trapezoidal prism. **2**

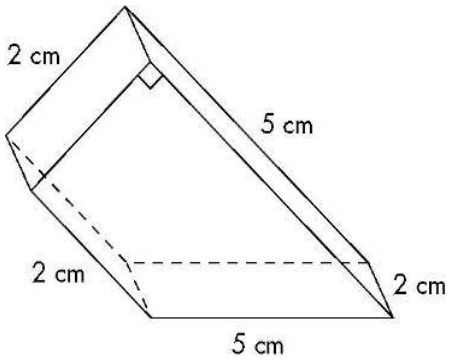
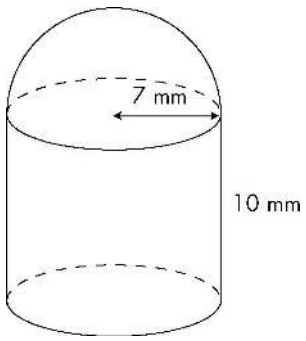


Diagram not to scale

Question 27 — Marks

Find the surface area of the following shape, giving your answer correct to two decimal places **2**

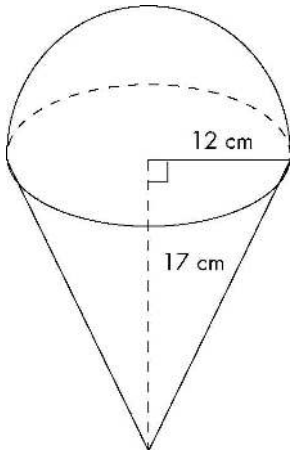
Diagram not to scale



Question 28 **Marks**

Find the volume of the following solid (leaving your answer in terms of π) **3**

Diagram not to scale



Question 29 **Marks**

What is the volume of a sphere with a radius double that of a sphere with a volume of 29 mm^3? **3**

End of Part A

Part B:

15 Marks
Attempt Questions 30 - 38
Allow about 15 minutes for this part

Write your answer in the spaces provided for each question.
ONE mark questions **do not** require working out.

Question 30 **Marks**

Write $10w^{-4}$ using a positive power. **1**

Question 31 **Marks**

Solve $22-9a>30$. **1**

Question 32 **Marks**

The interval AB has endpoints $A(-3, 1)$ and $B(7, 5)$. Find the distance of AB. **1**

Question 33 **Marks**

Evaluate $\left(2.7\times10^{5}\right)-\left(5\times10^{3}\right)$ giving your answer in scientific notation **1**

Question 34 **Marks**

What is the angle of inclination to the positive x-axis of a line with gradient -1? **1**

Question 35 **Marks**

Line 1 has a gradient of 2.
Line 2 is perpendicular to Line 1 and passes through the midpoint of $(-6, -2)$ and $(-4, 20)$.
Find the equation in gradient–intercept form of Line 2. **3**

Question 36 **Marks**

2

Rationalise the denominator $\dfrac{\sqrt{3}}{\sqrt{3}-2}$.

Question 37 **Marks**

Simplify $\left(\frac{8a^{-6}}{b^{18}}\right)^{\frac{2}{3}}$, expressing your answer with positive indices. **2**

Question 38 **Marks**

The sum of the digits of a two-digit number is 11.
If we interchange the digits then the new number formed is 45 less than the original number.
Find the original number. **3**

End of Part B

Part C:

15 Marks
Attempt Questions 39 - 47
Allow about 15 minutes for this part

Write your answer in the spaces provided for each question.
ONE mark questions **do not** require working out.

Question 39 **Marks**

Mr. Richard has two sons. Find the probability that they were both born on a Sunday. **1**

Question 40 **Marks**

For a loaded, 6-sided die, the probabilities of getting 3 and 6 are $\frac{2}{9}$ and $\frac{1}{3}$ respectively. **1**
All the remaining numbers are equally likely to occur. The dice is thrown twice. It is known that the number obtained at the first throw is 3, what is the probability that the total score is 5 or 6?

Question 41 **Marks**

A die is rolled 120 times and the results are recorded as follows:

Outcome	Frequency	Relative frequency
6	50	------
6' (Not 6)	70	x %

1

Calculate the value of x correct to 2 decimal places.

Question 42 **Marks**

The integers 8, 8, p, 10, q, 12, 12, 13, 14, 29 are in ascending order.
The mean is 12.5 and the median is 11.5. Find the value of p. **1**

Question 43 — Marks

The two-way table below shows the marital status of the employees in a certain company. An employee is chosen at random.

	Male	Female	Total
Married	14	8	22
Single	7	3	10
Divorced	1	0	1
	22	11	33

Find the probability that this person is either a married woman or a single man. **1**

Question 44 — Marks

A bag contains 15 marbles. The marbles are either white or black. When one marble is chosen at random from the bag, the probability that it is white is $\frac{2}{3}$.

(a) On the diagram, colour the circles in the bag to show how many marbles are black.



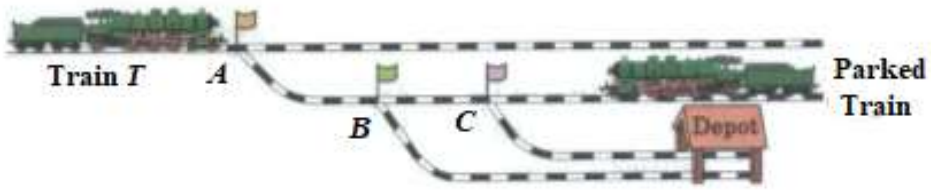
1

(b) Some red marbles are added to the bag so that the probability of choosing a red marble will be $\frac{1}{6}$. How many red marbles are added to the bag?

2

Question 45 — Marks

Refer to the diagram below, where A, B and C are the three junctions in a railway system.
At each junction, the train T may either go straight ahead or turn right.
The probability of the train going straight ahead is $\frac{2}{3}$.



Find the probability that:

(a) the train T crashes into the parked train.

.....

1

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(b) the train T enters the depot.

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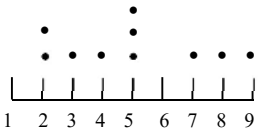
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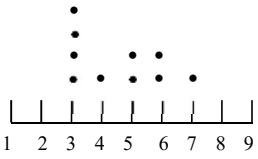
Question 46 — Marks

Consider the following two sets of data:

Set A:



Set B:



(a) Given the range of Set A is 7 and the inter-quartile range is 4, find the range and inter-quartile range for Set B.

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2

.....

(b) Which one is less dispersed? Justify your answer.

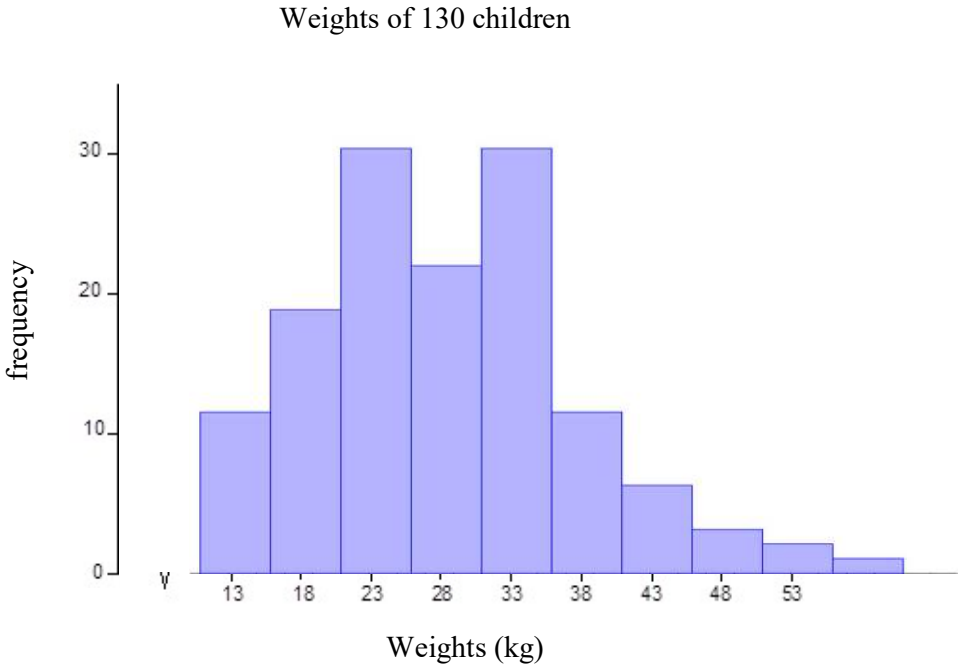
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1

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Question 47 **Marks**

The histogram below shows the distribution of the weights (in kg) of 130 children in a primary school.



1

Describe the shape of distribution of the above histogram, commenting on *two* features.

End of Part C

Part D:

15 Marks
Attempt Questions 48 - 55
Allow about 15 minutes for this part

Write your answer in the spaces provided for each question.
ONE mark questions **do not** require working out.

Question 48	**Marks**
Expand $(3x-1)^2$.	**1**

Question 49	**Marks**
Solve the equation $x^2 = 9x$.	**1**

Question 50	**Marks**
Factorise $9b-27+ab-3a$.	**1**

Question 51	**Marks**
What is the first thing you would do to fully factorise the quadratic expression $16x^2-96x+128$?	**1**

Question 52	**Marks**
Factorise x^2+5x+6.	**1**

Question 53 **Marks**

Solve $4x^2 - 20x + 25 = 0$, giving your answer(s) in simplest exact form. **2**

Question 53 **Marks**

Find the values of x that would solve the equation $x^4 - 13x^2 + 36 = 0$
by substituting u for x^2. **3**

Question 54 **Marks**

Mary factorised the quadratic equation $x^2 - 4x - 7 = 0$ by completing the square, but there is at *least* two mistakes in her solution
Mary's solution is below.
Circle the lines with mistakes, then rewrite the correct solution in the space provided above.

2

$x^2 - 4x - 7 = 0$

$x^2 - 4x = 7$

$x^2 - 4x + 4 = 7 + 4$

$(x-4)^2 = 11$

$x - 4 = \sqrt{11}$

$x = -4 + \sqrt{11}$

Question 55	**Marks**

Simplify $\frac{4}{x^2+x} - \frac{3}{x^2-1}$ completely. **3**

End of Part D

End of Section II ~ Extended Response

~ *END OF EXAMINATION* ~

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Hurlstone
Agricultural High
School

2019

Yearly Examination

Year 10 Mathematics

Multiple Choice Answer Sheet

Please **PRINT** your **name** and **class** clearly in the appropriate box.

Name

Class

1	A	B	C	D	11	A	B	C	D
2	A	B	C	D	12	A	B	C	D
3	A	B	C	D	13	A	B	C	D
4	A	B	C	D	14	A	B	C	D
5	A	B	C	D	15	A	B	C	D
6	A	B	C	D	16	A	B	C	D
7	A	B	C	D	17	A	B	C	D
8	A	B	C	D	18	A	B	C	D
9	A	B	C	D	19	A	B	C	D
10	A	B	C	D	20	A	B	C	D