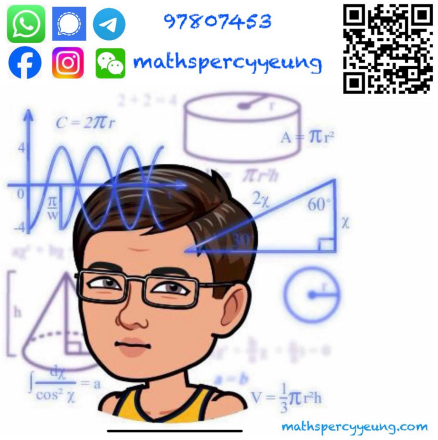
18-19 F.3
1st TERM UT1
MATH



2018 – 2019
Form 3 First Term Uniform Test 1

MATHEMATICS

Question–Answer Book

8th November, 2018
8:15 am – 9:15 am (1 hour)

This paper must be answered in English

INSTRUCTIONS

1. Write your name, class and class number in the spaces provided on this cover.

2. Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question – Answer Book.

3. Unless otherwise specified, all working must be clearly shown and numerical answers should be either exact or correct to 3 significant figures.

4. The diagrams in this paper are not necessarily drawn to scale.

Section	Marks
A Total	**/40**
B Total	**/30**
TOTAL	**/70**

Section A: (40 marks)

1. Evaluate the following expressions and express the answer in scientific notation.
   (a) 0.000 13
   (b) 512 000 000
   (c) 23.41×10^{-6}
   (d) $(4.8 \times 10^{-3}) \div (1.6 \times 10^{-5})$ (4 marks)

2. Alan's starting monthly salary was \$12 000. If he got a 5% rise in salary after the first year and a 3.75% rise after the second years, find his salary after these two years. (2 marks)

3. (a) Write down the place value of the digit underlined in $111\underline{0}1_2$.
   (b) Express $B7E_{16}$ in expanded form.
   (2 marks)

4. A candy manufacturer recorded the number of marshmallows in 100 packets and the results are as follows:

Number of marshmallows in each packet	40	41	42	43	44	45	46
Frequency	14	10	12	15	16	14	19

   Find the experimental probability of getting a packet with 44 marshmallows. (2 marks)

5. Simplify the following expression and express your answer with positive indices. (7 marks)

(a) $\left(\dfrac{a^4b^{-2}}{a^{-3}b^0}\right)^{-1}$

(b) $(\dfrac{3x^4}{y^5})^4 \div (\dfrac{-9x^3z^4}{y^2})^2$

6. (a) (i) Factorize x^2-5x-6.
(ii) Factorize $x^2+2xy+y^2$.

(b) Hence, or otherwise, factorize $a^2+2ab+b^2-5(a+b)-6$.

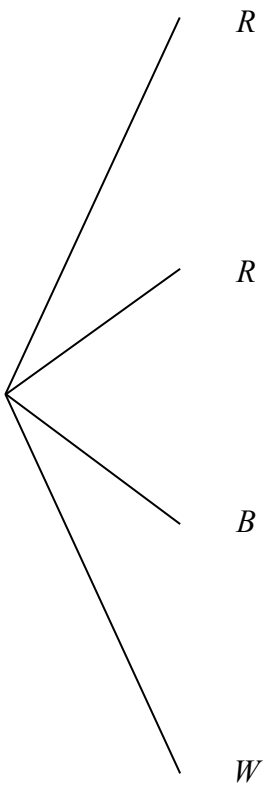
(5 marks)

7. The current value of a mobile phone is \$10 000. If its depreciation rate is 20% each year,
   (a) find its value 1 year ago,
   (b) find its value after 3 years,
   (c) after how many years will its value drop below \$4 000? (6 marks)

8. A water molecule consists of two hydrogen atoms and one oxygen atom. The weights of a hydrogen atom and an oxygen atom are 1.67×10^{-27} kg and 2.67×10^{-26} kg respectively.
   (a) Find the weight of a water molecule.
   (b) How many water molecules are there in 300 g of pure water?
   Express your answers in scientific notation. (5 marks)

9. There are 2 red hats, 1 blue hat and 1 white hat in a cupboard. Two hats are randomly drawn at the same time from the cupboard. Let *R* stand for a red hat, *B* stand for a blue hat and *W* stand for a white hat.

(a) Complete the tree diagram below to list all the possible outcomes of the colours of the two hats drawn.



(b) Find the probabilities that

(i) no blue hat is drawn,

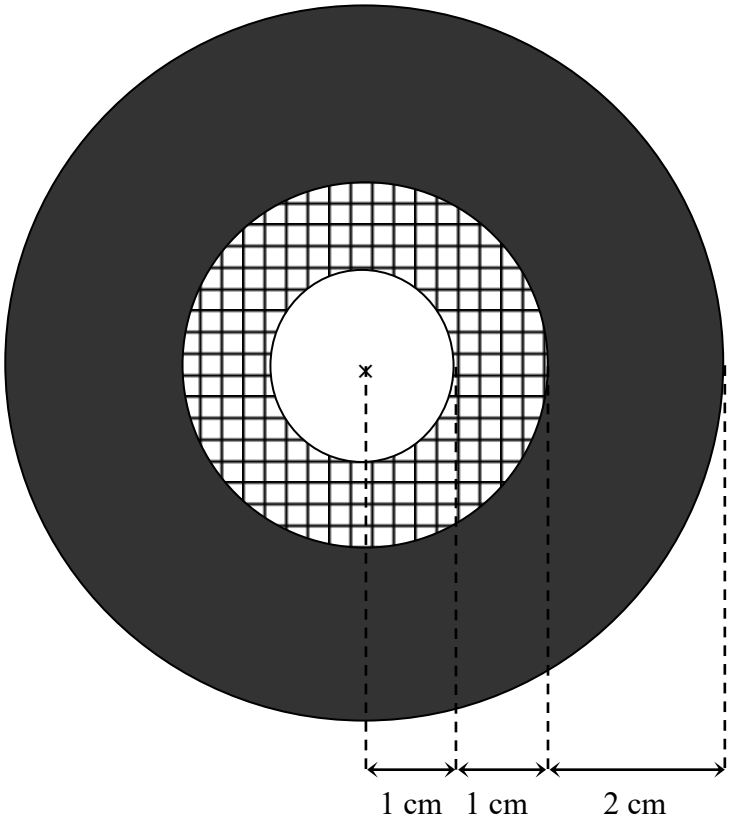
(ii) no red hat is drawn,

(iii) two white hats are drawn.

(7 marks)

Section B: (30 marks)

10. The figure shows a dartboard which is made up of three concentric circles. Kenny throws a dart onto the dartboard at random and the dart hits the dartboard.



Checkered region :

Shaded region :

(a) Find the probability that the dart will hit the following regions.

(i) The smallest circle

(ii) The checkered region

(iii) The shaded region

(6 marks)

(b) The prize will be given to Kenny as follows:

I. The dart hits the smallest circle $20

II. The dart hits the checkered region $10

III. The dart hits the shaded region $1

Suppose Kenny's dart will hit on one of the regions.

(i) Find the expected value of prize Kenny will get in one throw.

(ii) If Kenny needs to pay $5 for each throw, is the game worth playing? Explain your answer.

(4 marks)

11. Mr. Ma is considering the following saving plans:

Plan	Saving plan
A	Deposit \$2 400 000 on simple interest at an interest rate of 6% p.a. for 2 years
B	Deposit \$2 400 000 , compounded yearly. The amount is \$2 696 640 after 2 years.
C	Deposit \$1 200 000 at the beginning of each year at an interest rate of 5% p.a. compounded half-yearly for 2 years.

(a) If plan A is chosen, find the interest earned. (2 marks)

(b) If plan *B* is chosen,

(i) find the interest earned after 2 years,

(ii) find the interest rate per annum.

(4 marks)

(c) If plan *C* is chosen, find the amount at the end of the second year. (3 marks)

(d) Which plan should Mr. Ma choose to earn the most interest after 2 years? Explain briefly. (1 mark)

12. (a) Factorize

(i) $8x^3 - y^3$ (ii) $4x^2 + 8xy - 5y^2$ (iii) $4x^2 - y^2$ (5 marks)

(b) Hence factorize $\dfrac{\left(8x^3 - y^3\right) - \left(4x^3 + 8x^2y - 5xy^2\right)}{4x^2 - y^2}$. (5 marks)

End of Paper