19-20   F.5
2nd TERM UT
MATH CP

2019 – 2020
Form 5 Second Term Uniform Test

MATHEMATICS Compulsory Part

Question-Answer Book

11th June, 2020.
Time allowed: 55 minutes

This paper must be answered in English.

INSTRUCTIONS

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

2. This paper consists of FOUR sections, A, B(1), B(2) and C.

3. Answer ALL questions in Section A. You are advised to use an HB pencil to mark all the answers on the Answer Sheet, so that wrong marks can be completely erased with a clean rubber. You must mark the answers clearly; otherwise you will lose marks if the answers cannot be captured. You should mark only ONE answer for each question. If you mark more than one answer, you will receive NO MARKS for that question.

4. Attempt ALL questions in Sections B and C. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins. Answers written in the margins will not be marked. Unless otherwise specified, all working must be clearly shown and numerical answers should be either exact or correct to 3 significant figures.

5. The diagrams in this paper are not necessarily drawn to scale.
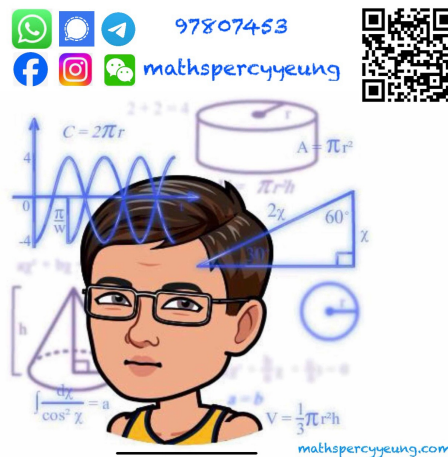
Section	Marks
A Total	**/ 24**
B (13)	/ 4
B (14 – 16)	/ 20
B Total	**/ 24**
C Total	**/ 8**
TOTAL	**/ 56**

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Section A (24 marks)
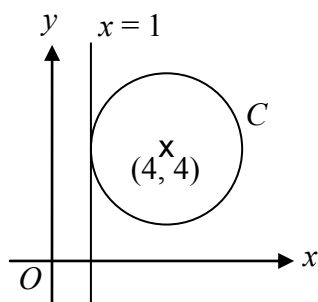**There are 12 questions in this section.**
Choose the best answer for each question.

1. For $0° \le x \le 180°$, how many roots does the equation $\sqrt{2}\sin x = \tan x$ have?
   A. 2
   B. 3
   C. 4
   D. 5

2. In the figure, the coordinates of the centre of the circle C is (4, 4). If C touches the straight line $x = 1$, find the equation of C.

   A. $x^2 + y^2 - 8x - 8y + 23 = 0$
   B. $x^2 + y^2 - 4x - 4y + 23 = 0$
   C. $x^2 + y^2 + 4x + 4y + 69 = 0$
   D. $x^2 + y^2 + 14x + 12y = 0$

3. The equation of a circle is $x^2 + y^2 + 4x - 8y + 11 = 0$. Which of the following are true?
   I. The coordinates of the centre of circle are (2, –4).
   II. The circumference of the circle is 6π.
   III. The area of the circle is 9π.
   A. **I** and **II** only
   B. **I** and **III** only
   C. **II** and **III** only
   D. **I**, **II** and **III**

4. A fair dice is thrown once. Find the probability that the number obtained is '4' or '5'.
   A. $\dfrac{1}{6}$
   B. $\dfrac{1}{4}$
   C. $\dfrac{1}{3}$
   D. $\dfrac{1}{2}$

5. A teacher has prepared 10 different presents for 4 students. Assume that each student receives one present. Find the number of ways to distribute the presents.
   A. 210
   B. 420
   C. 2 520
   D. 5 040

6. There are 20 editors in a publishing company. If 1 of them is selected as the chairperson and 5 of them are selected as the members of the Christmas Party Committee, the number of ways to form the committee is
   A. $20 \times C_5^{19}$.
   B. C_6^{20}.
   C. $20 \times P_5^{19}$.
   D. P_6^{20}.

7. A group of 100 students are studying in either school P or school Q. The numbers of boys and girls in the group are shown as follows.

	School P	School Q
Number of boys	28	11
Number of girls	32	29

A student is chosen at random from the group. Find the probability that the student is a student from school P or a boy.
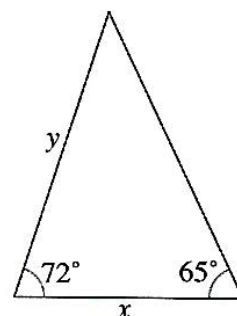
A. $\dfrac{7}{25}$

B. $\dfrac{39}{100}$

C. $\dfrac{71}{100}$

D. $\dfrac{99}{100}$

8. Bag A contains 2 red balls, 4 green balls and 5 blue balls while bag B contains 3 red balls, 3 yellow balls and 4 blue balls. If one ball is drawn randomly from each bag, the probability that the two balls drawn are of different colours is
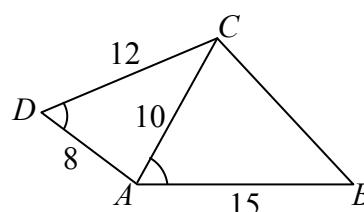
A. $\dfrac{12}{55}$.

B. $\dfrac{13}{55}$.

C. $\dfrac{36}{55}$.

D. $\dfrac{42}{55}$.

9. In the figure, $y =$

A. $\dfrac{x\sin 72°}{\sin 43°}$.

B. $\dfrac{x\sin 65°}{\sin 43°}$.

C. $\dfrac{x\sin 72°}{\sin 65°}$.

D. $\dfrac{x\sin 65°}{\sin 72°}$.

10. In the figure, $\angle BAC = \angle ADC$. Find BC.

A. 8

B. $8\dfrac{1}{3}$

C. 12

D. $12\dfrac{1}{2}$

11. $\dfrac{\sin(-\theta)}{\sin(360°+\theta)} + \dfrac{\tan(180°+\theta)}{\tan(180°-\theta)} =$

A. -2.

B. -1.

C. 1.

D. 2.

12. The least value of $\dfrac{1}{2-\cos x}$ is

A. -1.

B. $\dfrac{1}{3}$.

C. $\dfrac{1}{2}$.

D. 1.

Section B(1) (9 marks)

13. The table shows the quantities and unit prices of 1000 boxes of surgical masks bought by a company.

Brand	A	B	C	D	E
Quantity	250	150	x	130	230
Unit Price ($)	150	165	130	140	180

If a box of surgical masks is selected by random, find the probabilities that
(a) the box is of Brand C .
(b) the box is of unit price under $145.

(4 marks)

14. (a) Simplify $\dfrac{\sin(180°-\theta)\tan(90°+\theta)}{\cos(360°-\theta)}$.

(b) Solve $8\cos\theta - 3 = 1$ for $0° \le \theta \le 360°$.

(5 marks)

Section B(2) (15 marks)

15. The circle C passes through the point P (9, 4) and the centre of C is the point Q (3, –4) .

    (a) Find the equation of C .   (3 marks)

    (b) Prove that R (10, 20) lies outside C .   (1 mark)

    (c) Let S be a point on C such that S is nearest to R .

        (i) Find $QS : SR$.

        (ii) Find the coordinates of S .

                                                          (3 marks)

16. In the figure, P, O and Q are three points on a straight horizontal road, where $PO = 90$ m and $QO = 38$ m. A hot air balloon ascends from P and moves along a straight path which inclined at an angle of $20°$ with the horizontal road. When it reaches point X, the angle of elevation of the balloon from O is $75°$.
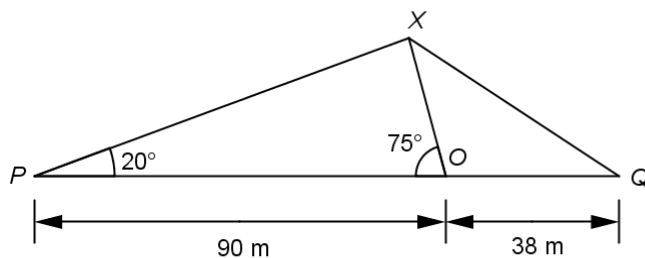
Figure 1

(a) Find the distance between O and X. (2 marks)

(b) The hot air balloon is about to descend along the path XQ and lands at Q.
   (i) Find the distance between Q and X.
   (ii) Find the area of $\triangle QOX$.
   (iii) Find the shortest distance from O to the balloon.

(6 marks)

Section C (8 marks)

17. 5 male workers and 10 female workers were having lunch in a restaurant.

    (a) The workers were queuing at random outside the restaurant.

        (i) Find the probability that the male workers were queuing together.

        (ii) Given that the male workers were queuing together, find the probability that the female workers were also queuing together.

                                                  (4 marks)

    (b) Due to the cap on public gatherings, the restaurant could serve a maximum of 8 persons per table.   Suppose that the workers were seated at random at Table A and Table B.

        (i) How many ways could the workers be grouped at Table A and Table B ?

        (ii) How many ways could the workers be grouped at Table A and Table B if all male workers were seated at the same table?

                                                    (4 marks)

END OF PAPER