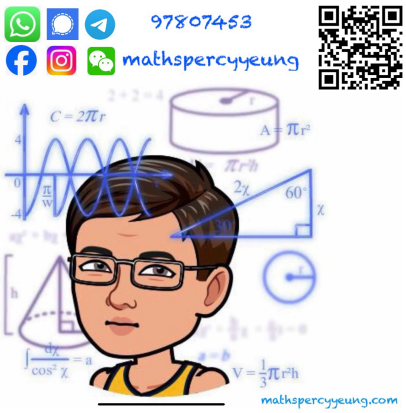
19-20 F.5
1st TERM EXAM
MATH CP
PAPER 2
MC



2019 – 2020
Form 5 First Term Examination

MATHEMATICS Compulsory Part

PAPER 2

2nd January, 2020. (Thursday)
10:30 am – 11:30 am (1 hour)

INSTRUCTIONS

1. Read carefully the instructions on the Answer Sheet. After the announcement of the start of the examination, you should insert the information required in the spaces provided.

2. When told to open this book, you should check that all the questions are there. Look for the words '**END OF PAPER**' after the last question.

3. All questions carry equal marks.

4. **ANSWER ALL QUESTIONS**. You should use an HB pencil to mark all your 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.

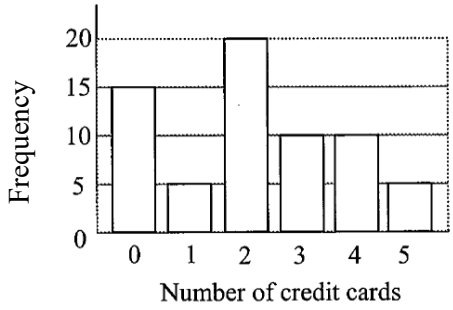
5. You should mark only **ONE** answer for each question. If you mark more than one answer, you will receive **NO MARKS** for that question.

6. No marks will be deducted for wrong answers.

There are 24 questions in Section A and 12 questions in Section B.
The diagrams in this paper are not necessarily drawn to scale.
Choose the best answer for each question.

Section A

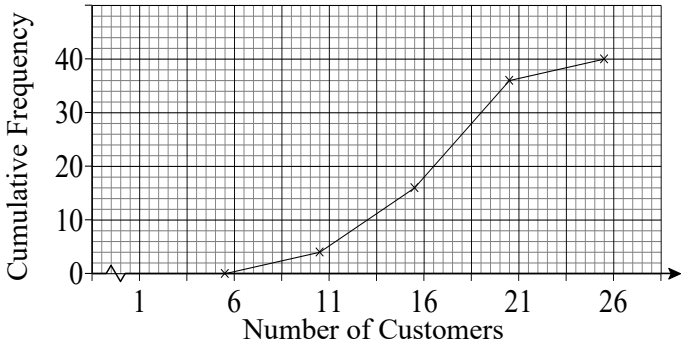
1. **Number of Credit Cards Owned by a Group of People**



The bar chart shows the distribution of the number of credit cards owned by a group of people. Find the median of the distribution.

A. 2
B. 2.15
C. 2.5
D. 3

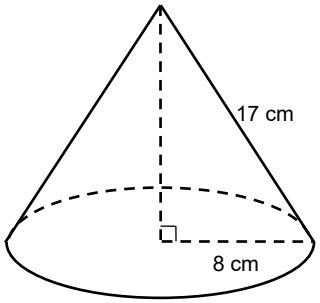
2. Number of Customers of the Booths within the First Hour of a Carnival



The figure shows the cumulative frequency polygon of the numbers of customers of the booths in a carnival within the first hour. Find the inter-quartile range of the distribution.

A. 6
B. 10
C. 16.5
D. 20

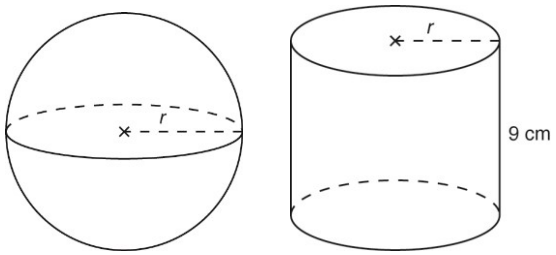
3.



The figure shows a right circular cone of base radius 8 cm and slant height 17 cm. Find the volume of the circular cone.

A. 136π cm^3
B. 200π cm^3
C. 320π cm^3
D. 960π cm^3

4.



The figure shows a sphere of radius r, and a cylinder of base radius r and height 9 cm. It is given that their total surface areas are equal. Find the volume of the sphere.

A. 108π cm^3
B. 324π cm^3
C. 486π cm^3
D. 972π cm^3

5. Let c be a constant. If α and β are the roots of the quadratic equation $x^2 - 4x + c = 0$, $\alpha^2 + 4\beta + c =$

A. -16.
B. 0.
C. 4.
D. 16.

6. Let k be a constant. If the quadratic equation $2x^2 - 4x + k = 1$ has no real roots, the range of values of k is

A. $k > 2$.
B. $k > 3$.
C. $k < 2$.
D. $k < 3$.

7. If $f(x) = \dfrac{x+2}{x-2}$, $\dfrac{f(3)}{f(-3)} =$

A. -25.
B. -1.
C. 1.
D. 25.

8. Which of the following statements about the graph of $y = -(x + 1)^2 + 4$ is true?

I. The x-intercepts of the graph are -3 and 1.
II. The equation of the axis of symmetry of the graph is $x = -1$.
III. The y-intercept of the graph is 4.

A. **I** only
B. **III** only
C. **I** and **II** only
D. **II** and **III** only

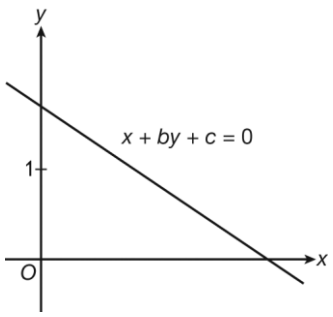
9. If $P(x) = x^{2020} + x + a$ is divisible by $x - 1$, where a is a constant, find the remainder when $P(x)$ is divided by $x + 1$.

A. -4
B. -2
C. 0
D. 2

10. The straight line L_2 is perpendicular to the straight line $L_1 : 4x - 3y + 6 = 0$. If L_2 has the same y-intercept as L_1, the equation of L_2 is

A. $3x + 4y - 8 = 0$.
B. $3x + 4y + 6 = 0$.
C. $4x - 3y - 8 = 0$.
D. $4x - 3y + 6 = 0$.

11.



The figure shows the graph of the straight line $x + by + c = 0$. Which of the following are true?

I. $b < 0$
II. $c < 0$
III. $b + c < 0$

A. **I** and **II** only
B. **I** and **III** only
C. **II** and **III** only
D. **I**, **II** and **III**

12. $\dfrac{5^n + 5^{n+2}}{5^{n-1}} =$

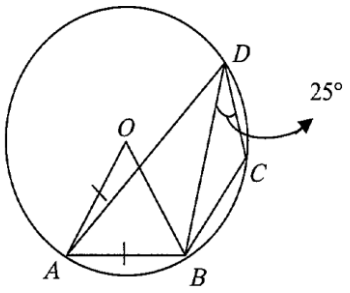
A. 30 .

B. 130 .

C. 5^{n+3} .

D. $5^{\frac{2n+2}{n-1}}$

13.



In the figure, O is the centre of the circle. If $\angle BDC = 25°$ and $OA = AB$, find $\angle OBC$.

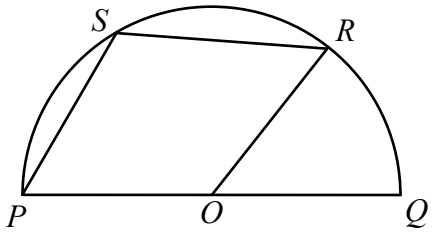
A. 60°

B. 65°

C. 75°

D. 85°

14.



In the figure, PQ is a diameter of the semi-circle $PQRS$ with centre O . If $\overset{\frown}{PS} = \overset{\frown}{SR}$ and $\angle POR = 136°$, $\angle SPO =$

A. 54°.

B. 56°.

C. 58°.

D. 60°.

15. The solutions of the compound inequality $\dfrac{19}{2} - \dfrac{3x}{4} \le \dfrac{1}{2}$ or $x - 1 > 0$ are

A. $x > 1$.

B. $x \ge 12$.

C. $1 < x \le 12$.

D. all real numbers.

16. The solutions of the compound inequality $-4 < \dfrac{x}{2} < 4$ and $3x - 2 > 13$ are

A. $x > 5$.

B. $-4 < x < 5$.

C. $-4 < x < 8$.

D. $5 < x < 8$.

17. It is given that y varies inversely as x^2 . If x increases by 25 % ,

A. y decreases by 64 % .

B. y decreases by 36 % .

C. y decreases by 20 % .

D. y increases by 56.25 % .

18. It is given that y partly varies directly as x and partly varies inversely as x . $y = 16$ when $x = 2$; $y = 19$ when $x = 3$. Find the value of y when $x = 6$.

A. 12

B. 18

C. 24

D. 32

19. A and B are fixed points and P is a moving point in the rectangular coordinate plane such that the area of $\triangle ABP$ is 10 . The locus of P is a

A. circle.

B. parabola.

C. straight line.

D. pair of parallel lines.

20. The coordinates of A and B are $(4, -7)$ and $(-6, 3)$ respectively. Let P be a moving point in the rectangular coordinate plane such that P is equidistant from A and B. Find the equation of the locus of P.

A. $x - y - 1 = 0$
B. $x - y - 11 = 0$
C. $x + y + 3 = 0$
D. $x + y + 9 = 0$

21. A circle C touches the y-axis. If the coordinates of the centre of C are $(-3, 5)$, find the equation of C.

A. $(x - 3)^2 + (y + 5)^2 = 9$
B. $(x - 3)^2 + (y + 5)^2 = 25$
C. $(x + 3)^2 + (y - 5)^2 = 9$
D. $(x + 3)^2 + (y - 5)^2 = 25$

22. The stem-and-leaf diagram below shows the distribution of weights (in kg) of 20 statues in a museum.

Stem (tens)	Leaf (units)
12	0 3 4
13	2 2 5 5 8
14	1 3 9
15	1 4 8 8 9
16	3 5 5 7

Find the inter-quartile range of the distribution.

A. 24 kg
B. 25 kg
C. 26 kg
D. 27 kg

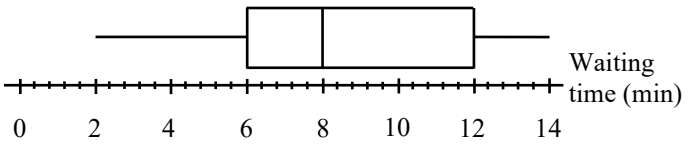
23. The table below shows the distribution of the weights (in kg) of 50 students.

Weight(kg)	40–44	45–49	50–54	55–59	60–64
Frequency	6	12	18	10	4

Find the standard deviation of the above distribution correct to the nearest 0.01 kg.

A. 4.90 kg
B. 4.97 kg
C. 5.54 kg
D. 7.07 kg

24. The box-and-whisker diagram shows the distribution of the waiting times (in min) of the passengers for bus 5A at a bus stop.

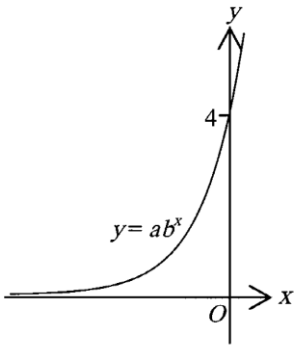


25 % of the passengers are waiting for

A. more than 6 min.
B. 2 to 12 min.
C. 6 to 12 min.
D. 8 to 12 min.

Section B

25.



The figure shows the graph of $y = ab^x$. Which of the following must be true?

I. $a = 4$
II. $0 < b < 1$
III. $x = \log_b \frac{a}{y}$

A. **I** only
B. **II** only
C. **I** and **III** only
D. **II** and **III** only

26. If $\log 5 = p$ and $\log 3 = q$, $\log_9 2 =$

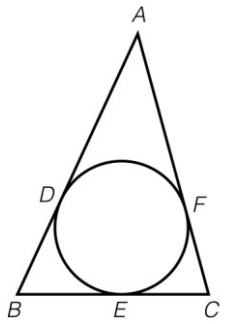
A. $p - q^2$.

B. $p - 2q$.

C. $\frac{1-p}{q^2}$.

D. $\frac{1-p}{2q}$.

27.



In the figure, three sides of ΔABC are tangents to the circle at D, E and F respectively. If $AF : FC = 5 : 2$, $AB = 9$ and $BC = 6$, $AF =$

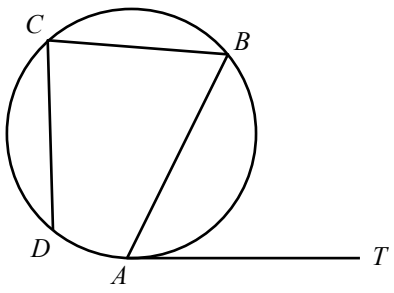
A. 4.

B. 5.

C. 7.5.

D. 10.

28.



In the figure, TA is the tangent to the circle $ABCD$ at A. If $\angle BAT = 64°$, $BC = CD$ and $\overset{\frown}{AB} : \overset{\frown}{CD} = 4 : 3$, $\angle BCD =$

A. 84°.

B. 88°.

C. 92°.

D. 96°.

29. Let k be a real constant. The imaginary part of the complex number $\frac{k}{1-2i} + ki$ is

A. $\frac{k}{5}$.

B. $\frac{7k}{5}$.

C. $\frac{k}{5}i$.

D. $\frac{7k}{5}i$.

30. Solve the inequality $3x^2 - 5x - 28 > 0$.

A. $-\frac{7}{3} < x < 4$

B. $-4 < x < \frac{7}{3}$

C. $x < -\frac{7}{3}$ or $x > 4$

D. $x < -4$ or $x > \frac{7}{3}$

31. Consider the system of inequalities

$$\begin{cases} 3x + 4y \le 120 \\ x - 2y + 10 \ge 0 \\ y \ge 6 \\ x \ge 10 \end{cases}.$$

Let D be the region which represents the solution of the system of inequalities. If (x, y) is a point lying in D, the greatest value of $2x + 3y + 20$ is

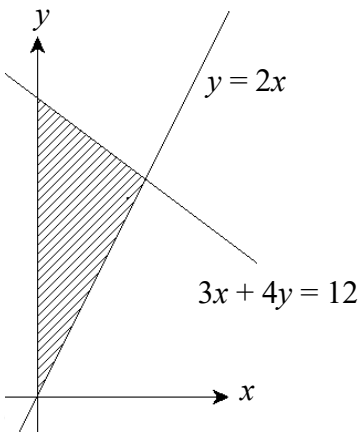
A. 96.

B. 98.

C. 102.

D. 105.

32.



Which of the following systems of inequalities has its solution represented by the shaded region in the figure?

A. $\begin{cases} y \geq 2x \\ 3x + 4y \leq 12 \\ x \geq 0 \end{cases}$

B. $\begin{cases} y \geq 2x \\ 3x + 4y \geq 12 \\ x \geq 0 \end{cases}$

C. $\begin{cases} y \leq 2x \\ 3x + 4y \leq 12 \\ x \geq 0 \end{cases}$

D. $\begin{cases} y \leq 2x \\ 3x + 4y \geq 12 \\ x \geq 0 \end{cases}$

33. It is given that the equation of a circle is $x^2 + y^2 - 4x - 12y - 12 = 0$. If $P(k, k+2)$ is a point outside the circle, find the range of values of k.

A. $-2 < k < 8$

B. $-8 < k < 2$

C. $k < -2$ or $k > 8$

D. $k < -8$ or $k > 2$

34. The mean score of a class of students in a test is 60 . The score and the standard score of Ricky in the test are 72 and 1.5 respectively. If the score of Vivian in the test is 42 , find her standard score.

A. -1

B. -1.5

C. -2.25

D. -3.75

35. The heights of 30 000 teenagers are normally distributed with a mean of 1.7 m and a standard deviation of 0.05 m. Assume that 68 %, 95 % and 99.7 % of the data lie within one, two and three standard deviation from the mean respectively. Find the number of teenagers whose heights lie between 1.6 m and 1.75 m.

A. 20 400

B. 24 450

C. 25 155

D. 28 500

36. The standard deviation of the set of data $\{x_1, x_2, x_3, x_4, x_5\}$ is σ . Find the standard deviation of the set of data $\{5 - 3x_1, 5 - 3x_2, 5 - 3x_3, 5 - 3x_4, 5 - 3x_5\}$.

A. 3σ

B. -3σ

C. $5 + 3\sigma$

D. $5 - 3\sigma$

END OF PAPER