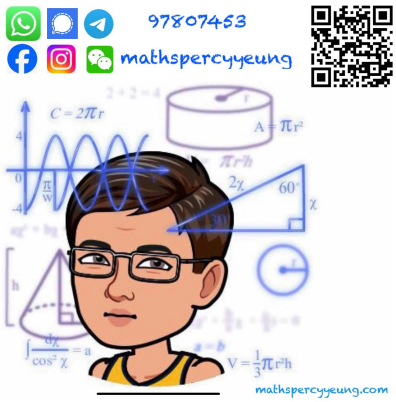
20-21 F.5
2nd TERM EXAM
MATH CP
PAPER 2
MC



2020 – 2021
Form 5 Second Term Examination

MATHEMATICS Compulsory Part

PAPER 2

18th June, 2021. (Friday)
11:00 am – 12:15 pm (1 hour 15 minutes)

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 30 questions in Section A and 15 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. $ab-abc+c-c^2=$

A. $(ab+c)(1-c)$.
B. $(ab+c)(1+c)$.
C. $(ab-c)(1-c)$.
D. $(ab-c)(1+c)$.

2. $27^{333}\cdot 4^{999}=$

A. 12^{999}.
B. 12^{1332}.
C. 108^{999}.
D. 108^{1332}.

3. If a and b are constants such that $5x^2-6x+a\equiv 5(x-2)^2-bx$, then $b=$

A. – 24.
B. – 20.
C. – 14.
D. 20.

4. The marked price of a can of Potato Cat Food is 40% above the cost. If the can is sold at a 20% discount on the marked price, then the profit percentage is

A. 8%.
B. 12%.
C. 20%.
D. 88%.

5. If k is a constant such that the quadratic equation $x^2+kx+(5-2k)=0$ has equal roots, then $k=$

A. 1.
B. 5.
C. –10 or 2.
D. –1 or 20.

6. Let a be a constant. Solve the equation $x(x-1)=a(a-1)$.

A. $x=a$.
B. $x=-a$.
C. $x=a$ or $x=1-a$.
D. $x=a$ or $x=a-1$.

7. Let $f(x)=x^2-kx+5$, where k is a constant. Then $f(3)-f(-3)=$

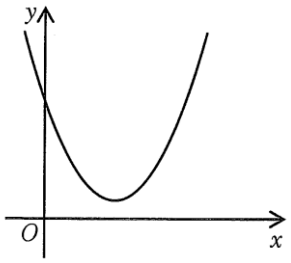
A. 0.
B. 28.
C. $6k$.
D. $-6k$.

8. Let $f(x)=ax^{16}-bx+c$, where a, b and c are constants. It is given that $f(x)$ is divisible by $x+1$. Find the remainder when $f(x)$ is divided by $x-1$.

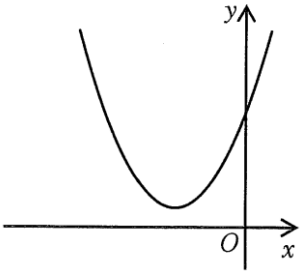
A. $-2b$
B. $2b$
C. $2a-2b$
D. $-2a-2b$

9. If $k < 0$, which of the following may represent the graph of $y = k(x+k)^2 + k$?

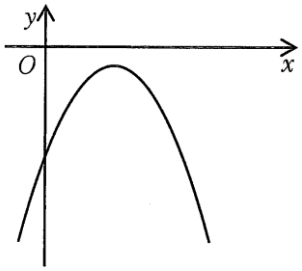
A.



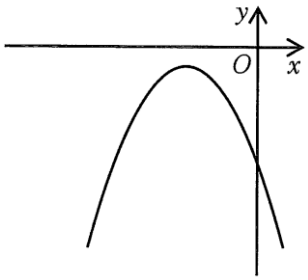
B.



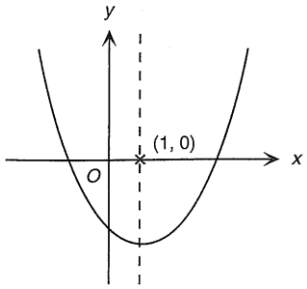
C.



D.



10. The figure shows the graph of $y = a(x-b)(x-c)$, where $b < c$. Given that the axis of symmetry of the graph cuts the x-axis at (1, 0), which of the following are true?



I. $a > 0$

II. $b = 2 - c$

III. $abc < 0$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

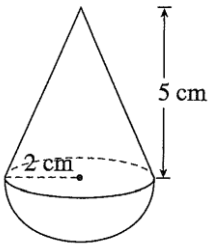
11. In the figure, the solid consists of a hemisphere of radius 2 cm joined to the bottom of a right circular cone of height 5 cm and base radius 2 cm. Find the volume of the solid.

A. 10π cm^3

B. 12π cm^3

C. $\frac{32\pi}{3}$ cm^3

D. $\frac{76\pi}{3}$ cm^3



12. The solution of $6 - 5x < \frac{2+x}{3}$ and $2x - 1 \geq 0$ is

A. $x \geq \frac{1}{2}$.

B. $x > 1$.

C. $x \leq \frac{1}{2}$ or $x > 1$.

D. $\frac{1}{2} \leq x < 1$.

13. If $a > 0 > b > c$, which of the following are true?

I. $a + b > a + c$

II. $ab > ac$

III. $b^2 > c^2$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

14. $A(0, 4)$ and $B(2, -2)$ are two points. It is given that the y-intercept of L is $-\frac{2}{5}$ and L is parallel to AB. Find the equation of L.

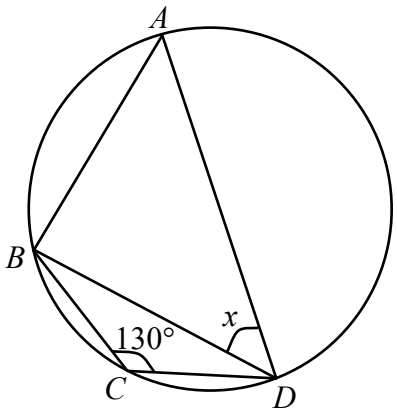
A. $y = \frac{1}{3}x - \frac{2}{5}$

B. $y = -\frac{1}{3}x - \frac{2}{5}$

C. $y = 3x - \frac{2}{5}$

D. $y = -3x - \frac{2}{5}$

15. In the figure, AD is a diameter of the circle $ABCD$. $\angle BCD = 130°$. Find x.



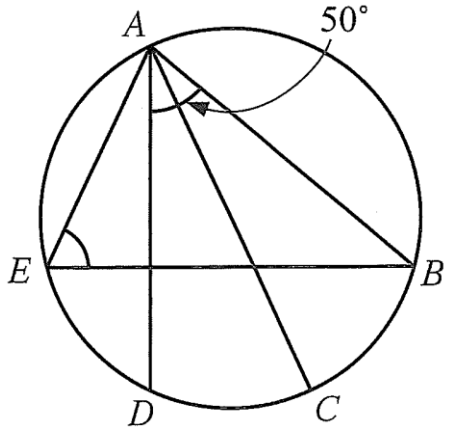
A. 40°

B. 50°

C. 60°

D. 65°

16. In the figure, AC is a diameter of the circle $ABCDE$. If $\angle BAD = 50°$ and $BC = CD$, then $\angle AEB =$



A. 40°.

B. 45°.

C. 50°.

D. 65°.

17. It is given that z is partly constant and partly varies as x^2. When $x = 0$, $z = 5$; when $x = 2$, $z = 9$. Find z when $x = 3$.

A. 8

B. 14

C. 15

D. 33

18. It is given that y varies directly as x and inversely as z^2. If x and z are both increased by 25%, then y

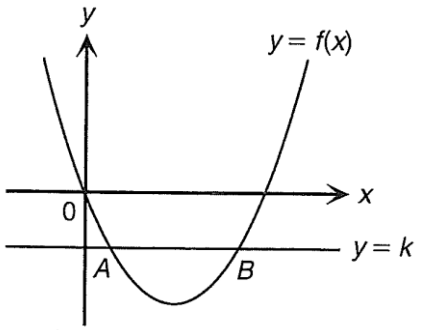
A. is increased by 20%.

B. is increased by 25%.

C. is decreased by 20%.

D. is decreased by 25%.

19. In the figure, the quadratic graph of $y = f(x)$ intersects the line $y = k$ at A and B. If the roots of the equation $f(x) = k$ are 2 and 6, which of the following are true?



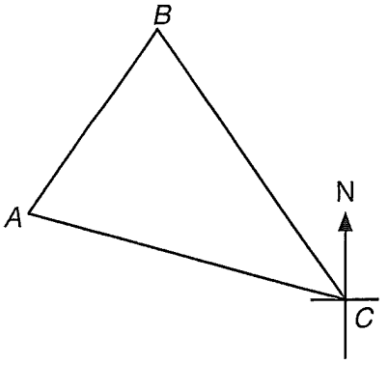
I. The coordinates of B are $(6, k)$.

II. The solution of the inequality $f(x) \le 0$ is $2 \le x \le 6$.

III. The equation of the axis of symmetry of $y = f(x)$ is $x = 4$.

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

20. In the figure, $AC = BC$. If B is at the northeast of A and $\angle ACB = 40°$, then the bearing of A from C is



A. N65°W .
B. N40°W .
C. S65°E .
D. S40°E .

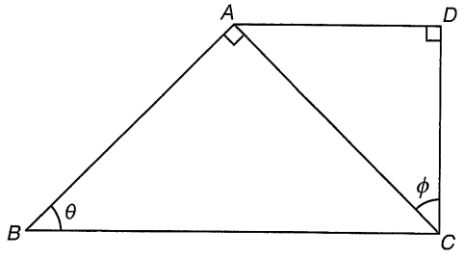
21. $\dfrac{[1+\sin(90°-\theta)][1-\cos(360°-\theta)]}{\sin(270°+\theta)} =$

A. $\sin\theta$.
B. $-\sin\theta$.
C. $\sin\theta\tan\theta$.
D. $-\sin\theta\tan\theta$.

22. The greatest value of $\dfrac{6-\cos\theta}{7+\cos\theta}$ is

A. $\dfrac{5}{8}$.
B. $\dfrac{6}{7}$.
C. 1 .
D. $\dfrac{7}{6}$.

23. In the figure, $\dfrac{CD}{AB} =$



A. $\cos\phi\tan\theta$.
B. $\sin\phi\tan\theta$.
C. $\dfrac{1}{\cos\phi\tan\theta}$.
D. $\dfrac{1}{\sin\phi\tan\theta}$.

24. $P(2, 13)$ and $Q(-3, 4)$ are two points. If M is a moving point such that the perpendicular distance from M to the straight line PQ is always 5 units. The locus of M is

A. the perpendicular bisector of PQ.
B. a circle.
C. a pair of parallel lines.
D. the angle bisector of $\angle POQ$.

25. Which of the following statements about the circle $2x^2 + 2y^2 + 12x - 8y - 6 = 0$ must be true?

I. The centre of the circle is (–6, 4).
II. The radius of the circle is 4.
III. The origin lies inside the circle.

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

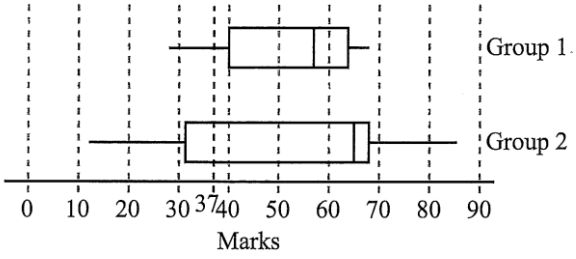
26. Find the area of the circle $x^2 + y^2 + x - 3y - \frac{7}{2} = 0$.

A. 2π sq. units
B. 6π sq. units
C. 8π sq. units
D. $\frac{15}{2}\pi$ sq. units

27. A box contains seven balls marked with the numbers –3, –2, –1, 1, 2, 3 and 4 respectively. If two balls are drawn randomly from the box at the same time, find the probability that the product of the numbers on the balls drawn is positive.

A. $\frac{5}{42}$.
B. $\frac{1}{6}$.
C. $\frac{2}{7}$.
D. $\frac{3}{7}$.

28. The two box-and-whisker diagrams below show the distribution of the marks that two groups of students got in a test. Which of the following must be true?



I. Inter-quartile range of the marks of group 1 < Inter-quartile range of the marks of group 2.
II. Median of the marks of group 1 < Median of the marks of group 2.
III. If the passing mark is 37, then the number of group 1 students who passed the test is more than that of group 2.

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

29. Consider the following integers:

1 2 3 3 3 m 5 6 7 8 n

It is known that $3 \le m \le 5$ and $n \ge 8$. Let p, q and r be the mean, the median and the mode of the above integers respectively. Which of the following must be true?

I. $p > q$
II. $p > r$
III. $q > r$

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

30. The stem and leaf diagram below shows the distribution of the heights (in cm) of the members of a football team.

Stem (tens)	Leaf (units)			
15	a	4	5	
16	3	6	7	7
17	0	0	1	2
18	6	7	b	

If the range of the above distribution is at most 35, which of the following must be true?

I. $0 \le a \le 3$
II. $7 \le b \le 9$
III. $5 \le b - a \le 7$

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

Section B

31. $\dfrac{x+1}{x^2-1} + \dfrac{4}{4-x} =$

A. $\dfrac{3x}{(x-1)(x-4)}$.
B. $\dfrac{3x+2}{(x-1)(x-4)}$.
C. $-\dfrac{3x}{(x-1)(x-4)}$.
D. $-\dfrac{3x+2}{(x-1)(x-4)}$.

32. If β is a real number, then $3i(5-\beta i^3) =$

A. $-3\beta - 15i$.
B. $-3\beta + 15i$.
C. $3\beta - 15i$.
D. $3\beta + 15i$.

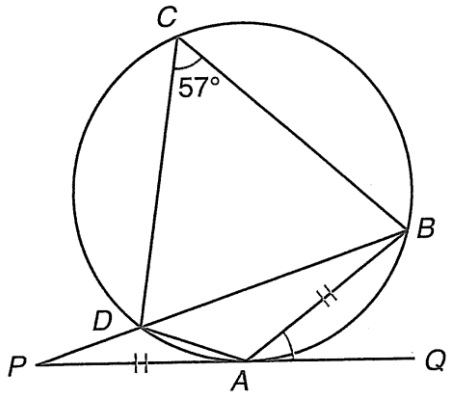
33. Let k be a non-zero constant. If $\begin{cases} 2\alpha^2 = 6\alpha - k \\ 2\beta^2 = 6\beta - k \end{cases}$, where $\alpha \ne \beta$, then $\alpha^2 + 3\beta =$

A. $-9 + \dfrac{k}{2}$.
B. $-9 - \dfrac{k}{2}$.
C. $9 + \dfrac{k}{2}$.
D. $9 - \dfrac{k}{2}$.

34. Solve $3\cos^2\theta = 5\cos\theta + 2$ for $0° \le \theta \le 360°$. (Give your answers correct to 3 significant figures.)

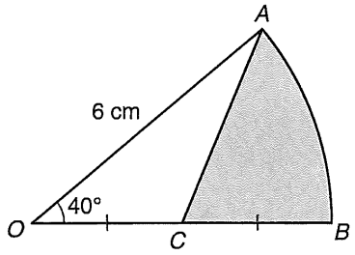
A. 109° or 251°
B. 70.5° or 290°
C. 109° or 290°
D. 70.5° or 109°

35. In the figure, PQ is the tangent to the circle at A. PDB is a straight line and $AP = AB$. Find $\angle BAQ$.



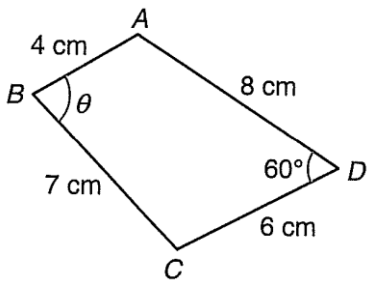
A. 38°
B. 43°
C. 51°
D. 57°

36. In the figure, OAB is a sector and $OC = CB$. Find the area of the shaded region, correct to 2 decimal place.



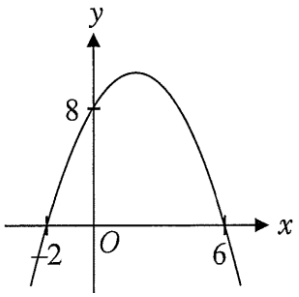
A. 6.42 cm^2
B. 6.78 cm^2
C. 7.24 cm^2
D. 7.56 cm^2

37. Find θ in the figure, correct to 3 significant figures.



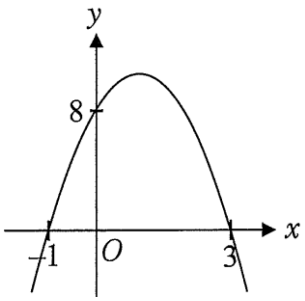
A. 80.0°
B. 76.6°
C. 75.4°
D. 71.1°

38. The following figure shows the graph of $y = f(x)$.

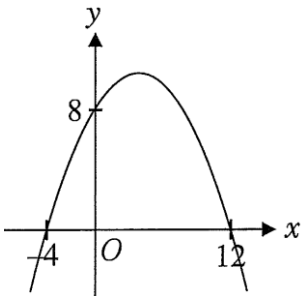


If $g(x) = f(2x)$, which of the following may represent the graph of $y = g(x)$?

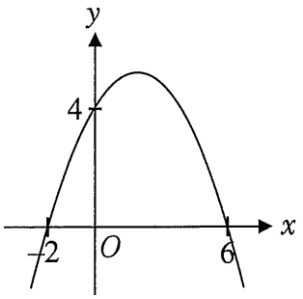
A.



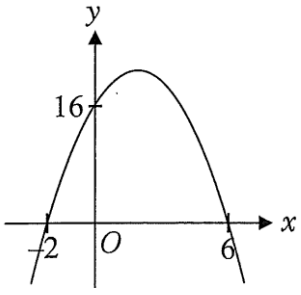
B.



C.

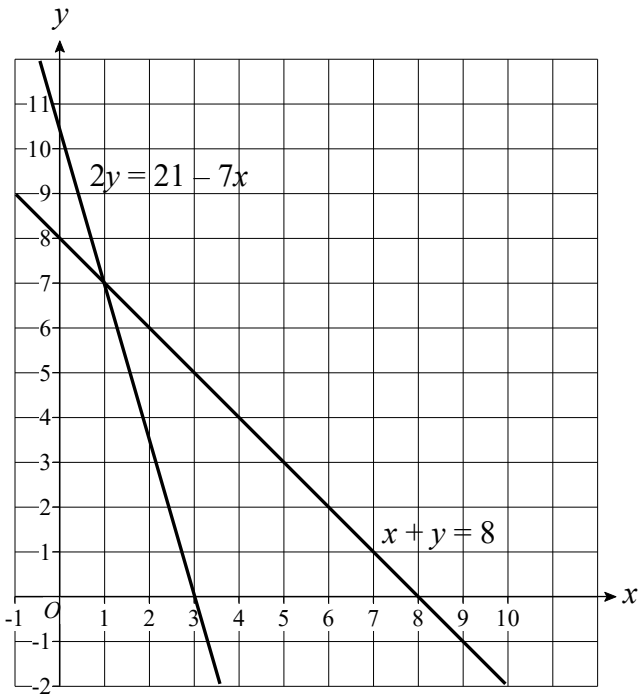


D.



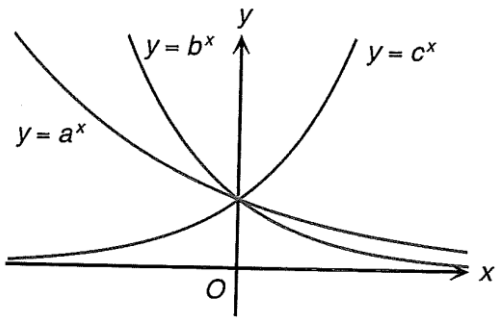
39. Find the maximum value of $P = 5x - 2y$ subject to the following constraints:

$$\begin{cases} x + y \le 8 \\ 2y \ge 21 - 7x \\ 0 \le x \le 6 \\ y \ge 0 \end{cases}$$



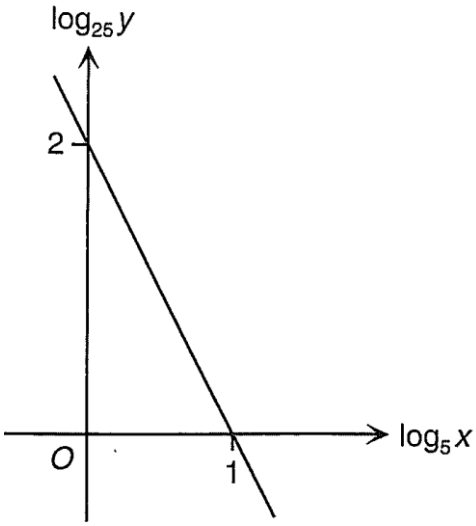
A. 5
B. 19
C. 26
D. 30

40. The figure shows the graphs of $y = a^x$, $y = b^x$ and $y = c^x$, where a, b and c are positive constants. Which of the following must be true?



A. $a < b < c$
B. $b < a < c$
C. $c < b < a$
D. $a < c < b$

41. The graph of the figure shows the linear relation between $\log_{25} y$ and $\log_5 x$. If $y = kx^n$, then $k =$



A. -4.
B. $-\frac{1}{4}$.
C. $\frac{1}{625}$.
D. 625.

42. A queue is formed by 8 boys and 3 girls. If no girls are next to each other, how many different queues can be formed?

A. 120 960
B. 1 088 640
C. 20 321 280
D. 29 393 280

43. A box contains 4 green balls and 8 red balls. If 4 balls are randomly drawn from the box at the same time, find the probability that at least 3 red balls are drawn.

A. $\frac{1}{15}$

B. $\frac{14}{55}$

C. $\frac{98}{165}$

D. $\frac{224}{495}$

44. Find the x-coordinate of the mid-point of the intersecting points of the circle $x^2 + y^2 - 6x - 4y - 12 = 0$ and the straight line $x + 2y - 2k = 0$.

A. $\frac{2k-1}{5}$

B. $\frac{2k+4}{5}$

C. $\frac{2k+7}{5}$

D. $\frac{2k+8}{5}$

45. If the variance of the five numbers a, b, c, d and e is 4, then the variance of the five numbers $14 - 3a$, $14 - 3b$, $14 - 3c$, $14 - 3d$ and $14 - 3e$ is

A. 2 .

B. 12 .

C. 36 .

D. 50 .

END OF PAPER