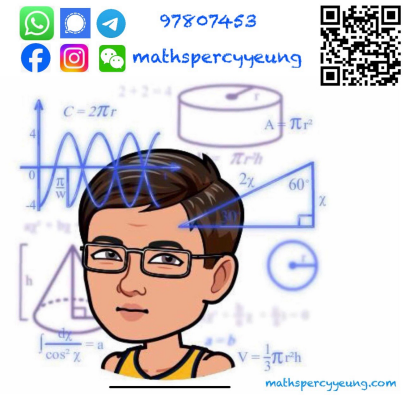
2021-2022 S4
2nd TERM EXAM
MATH CP
PAPER 2
MC



2021 – 2022
S4 Second Term Examination

MATHEMATICS Compulsory Part

PAPER 2

20th June, 2022
10:15 am – 11:15 am (1 hour)
Total Marks: 36

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. $\dfrac{81^{4n}}{(27^{2n})(3^{-2n})}$ =

   A. 9^{2n}.

   B. 9^{6n}.

   C. 9^{8n}.

   D. 9^{12n}.

2. If $k(2-c) = -c(k-3)$, then k =

   A. $\dfrac{3}{2}c$.

   B. $-\dfrac{3}{2}c$.

   C. $\dfrac{c-3}{c+2}$.

   D. $\dfrac{c+3}{c+2}$.

3. $a^3 + a^2 - ab^2 - b^2$ =

   A. $2(a+b)(a-b)$.

   B. $(a+1)(a-b)^2$.

   C. $(a-1)(a+b)(a-b)$.

   D. $(a+1)(a+b)(a-b)$.

4. The marked price of a book is x% higher than its cost. If the book is sold at a discount of 10%, the percentage profit is 35%. Find x.

   A. 38.5

   B. 45

   C. 47.5

   D. 50

5. $\dfrac{3}{3-y} - \dfrac{2}{2-y} =$

   A. $\dfrac{y}{(y-3)(2-y)}$.

   B. $\dfrac{y}{(y-3)(y-2)}$.

   C. $\dfrac{5y}{(y-3)(2-y)}$.

   D. $\dfrac{5y}{(y-3)(y-2)}$.

6. Which of the following are irrational numbers?

   I. $\sqrt{\dfrac{1}{3}}$

   II. $\cos 30° - 2$

   III. $3.\dot{1}0\dot{2}$

   A. I and II only

   B. I and III only

   C. II and III only

   D. I, II and III

7. Let m be a non-zero constant. If the quadratic equation $mx^2 - 3(mx - 1) = 0$ has equal roots, then m =

   A. $-\dfrac{4}{3}$.

   B. $-\dfrac{4}{9}$.

   C. $\dfrac{4}{9}$.

   D. $\dfrac{4}{3}$.

8. Let $f(x) = (1 - x)(x + 2) - k$, where k is a constant. If $f(0) = 3$, then $k =$

A. –1.

B. 0.

C. 1.

D. 1.5.

9. If $g(x) = -3(x + 2)$, then $g(x) - g(x - 1) =$

A. –5.

B. –3.

C. 3.

D. 9.

10. Let v and w be two non-zero real constants. Which of the following statements about the graph of $y = -(x + v)^2 - w^2$ are true?

I. The graph opens downward.

II. The y-intercept of the graph is negative.

III. The graph intersects the x-axis.

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

11. Which of the following statements about the graph of $y = 18 - x(3 + x)$ is true?

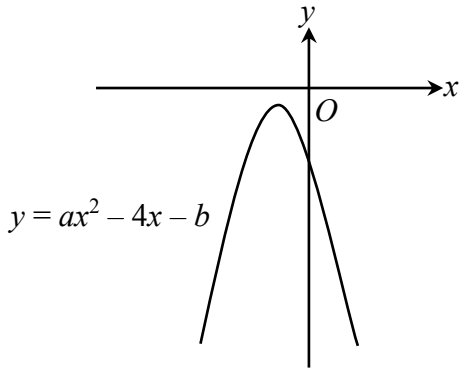
A. The graph passes through the point (–4 , 21).

B. The y-intercept of the graph is 15.

C. The equation of the axis of symmetry of the graph is $x = -1.5$.

D. The graph has no x-intercepts.

12. The figure shows the graph of $y = ax^2 - 4x - b$, where a and b are constants. Which of the following is true?



A. $a < 0$ and $ab > -4$

B. $a < 0$ and $ab < -4$

C. $a > 0$ and $ab > -4$

D. $a > 0$ and $ab < -4$

13. Let c be a constant. The graph of $y = 2x^2 - 4x + c$ cuts the y-axis at (0 , –30). The coordinates of the vertex of the graph are

A. (–1 , –24).

B. (–1 , –12).

C. (1 , –32).

D. (1 , –16).

14. Let k be a constant. If $x^3 - kx^2 + x + 6$ is divisible by $x - 2$, then $k =$

A. 16.

B. 4.

C. 0.

D. –4.

15. When a polynomial $g(x)$ is divided by $x+1$, the quotient is $2x^2-3x+5$. If $g(-1) = -3$, then $g(2) =$

A. –22.

B. 3.

C. 18.

D. 23.

16. If a polynomial $g(x)$ is divisible by $x-2$, which of the following must be a factor of $g(2x-1)$?

A. $x-2$

B. $2x+1$

C. $2x-1$

D. $2x-3$

17. The coordinates of the points P, Q and R are (–6 , 4), (1 , 0) and (5 , 2) respectively. If Y is the mid-point of QR, Find the equation of the straight line which passes through P and Y.

A. $x + y + 2 = 0$

B. $x + 3y - 6 = 0$

C. $3x + y - 10 = 0$

D. $3x + y + 14 = 0$

18. The equation of the straight line L is $ax + by - 1 = 0$, where a and b are constants. If L is perpendicular to the straight line $6x + 4y + 3 = 0$ and passes through the point (4 , 3), find the x-intercept of L.

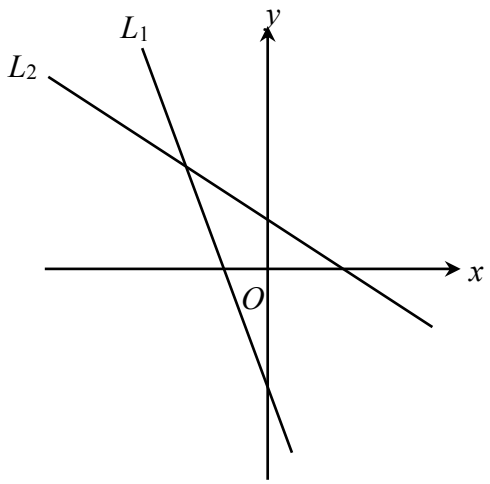
A. $-\frac{1}{2}$

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

C. 6

D. 9

19. In the figure, the equations of the straight lines L_1 and L_2 are $mx - ny = 2$ and $px + qy = -3$ respectively. Which of the following are true?



I. $n > 0$

II. $pq > mn$

III. $p + q < n - m$

A. I and II only

B. I and III only

C. II and III only

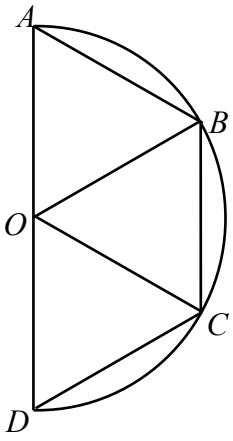
D. I, II and III

20. In the figure, O is the centre of the semi-circle $ABCD$. If OB // DC and $\angle OCD = \theta$, which of the following must be true?

I. $\angle ABC = 180° - \theta$

II. $\overset{\frown}{AB} = \overset{\frown}{BC}$

III. $AB = CD$



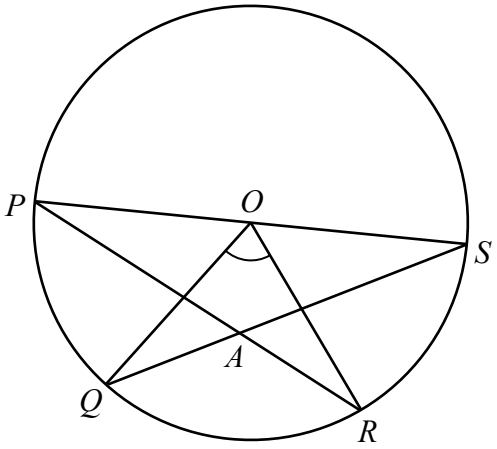
A. I and II only

B. I and III only

C. II and III only

D. I, II and III

21. In the figure, O is the centre of the circle $PQRS$. PS is a diameter of the circle. PR and QS intersect at the point A. If $\angle QAR = 126°$, find $\angle QOR$.



A. 36°

B. 54°

C. 63°

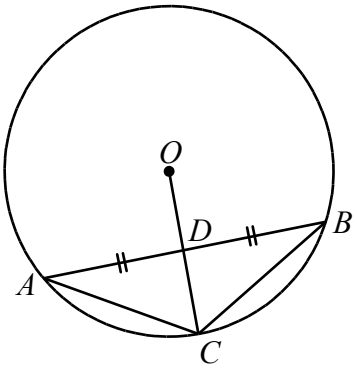
D. 72°

22. In the figure, O is the centre. OC and AB intersect at a point D and $AD = BD$. Which of the following must be true?

I. $DC \perp AB$

II. $AC = BC$

III. $OD = DC$



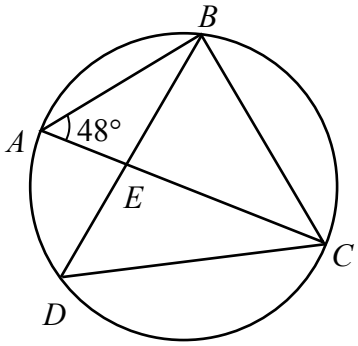
A. I only

B. II only

C. I and II only

D. I, II and III

23. In the figure, AC is a diameter of circle $ABCD$. AC and BD intersect at E. If $BD = CD$ and $\angle BAC = 48°$, find $\angle BEC$.



A. 66°

B. 72°

C. 78°

D. 84°

24. If $y = x^2 - 6 = 4x - 6$, then $y =$

A. 0.

B. 10.

C. 0 or 4.

D. –6 or 10.

Section B

25. If α is a real number, then the real part of $\frac{2i-\alpha}{3i-1}$ is

A. $\frac{\alpha}{10}$.

B. α.

C. $\frac{6+\alpha}{10}$.

D. $\frac{6-\alpha}{8}$.

26. If $a>0$, then $\frac{2a\sqrt{2a}}{3}-\frac{3a^3}{\sqrt{2a^3}}$ =

A. $-\frac{7}{3}a^2$.

B. $-\frac{7}{3}a\sqrt{2a}$.

C. $-\frac{5}{6}a^2$.

D. $-\frac{5}{6}a\sqrt{2a}$.

27. If $a \neq b$ and $3a^2 - 7a = 3b^2 - 7b = 12$, then $(a-6)(b-6)$ =

A. 18.

B. 26.

C. 46.

D. 54.

28. If $3^{1-x}\cdot\sqrt{27^x}=9^{x+2}$, then $3^{\frac{x}{4}}$ =

A. $-\frac{3}{2}$.

B. $-\frac{1}{2}$.

C. $\frac{\sqrt{3}}{3}$.

D. $\frac{2}{3}$.

29. If $3 = 10^m$ and $2 = 10^n$, then $\log\frac{20}{81}$ =

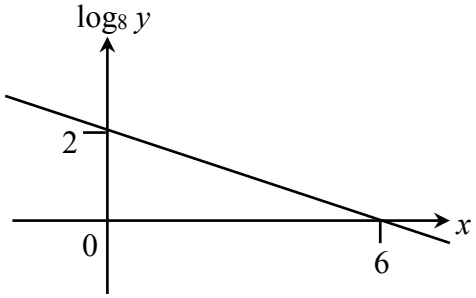
A. $n - 4m$.

B. $1 + n - 4m$.

C. $\frac{n}{4m}$.

D. $\frac{1+n}{4m}$.

30. The graph below shows the linear relation between x and $\log_8 y$. If $y = cd^x$, then d =



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

B. $\frac{1}{512}$.

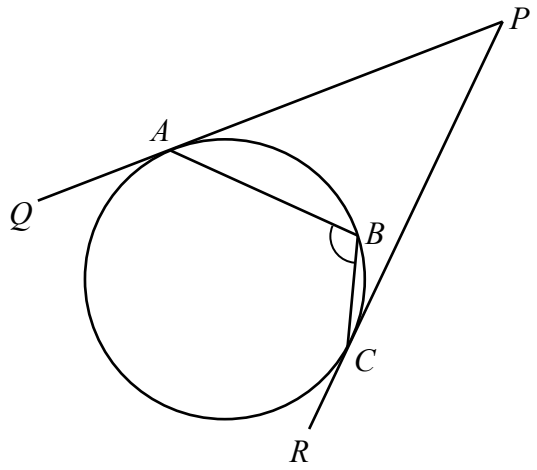
C. 2.

D. 512.

31. Ivan kicks a football upwards. The football is h m above the ground after kicking up for t s, where $h=-t^2+4.8t+1$. Find the time required and the height from the ground for the football reaching its highest position.

	Time required	Height
A.	2.4 s	4.76 m
B.	4.8 s	4.76 m
C.	2.4 s	6.76 m
D.	4.8 s	6.76 m

32. In the figure, PQ and PR are the tangents to the circle ABC at A and C respectively. If $\angle QPR = \frac{x}{2}$, then $\angle ABC =$



A. x.

B. $90° - \frac{x}{4}$.

C. $90° + \frac{x}{4}$.

D. $90° + \frac{x}{2}$.

33. The H.C.F. and the L.C.M. of three expressions are $a^7b^7c^3$ and $a^9b^8c^{10}$ respectively. If the first expression and the second expression are $a^7b^8c^7$ and $a^8b^8c^{10}$ respectively, then the third expression is

A. $a^8b^8c^3$.

B. $a^8b^8c^7$.

C. $a^9b^7c^3$.

D. $a^9b^7c^7$.

34. $\frac{2}{x-3} + \frac{1+x}{(3-x)(3+x)} =$

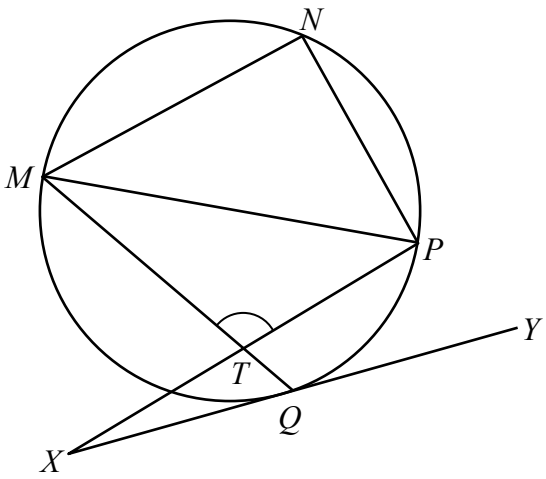
A. $\frac{x+2}{x^2-9}$.

B. $\frac{x+5}{x^2-9}$.

C. $\frac{3x+2}{x^2-9}$.

D. $\frac{3x+5}{x^2-9}$.

35. In the figure, MP is a diameter of the circle $MNPQ$. XY is the tangent to the circle at Q. PX and MQ intersect at the point T. NP is perpendicular to PX. If $\angle NMP = 52°$ and $\angle PXY = 14°$, then $\angle MTP =$



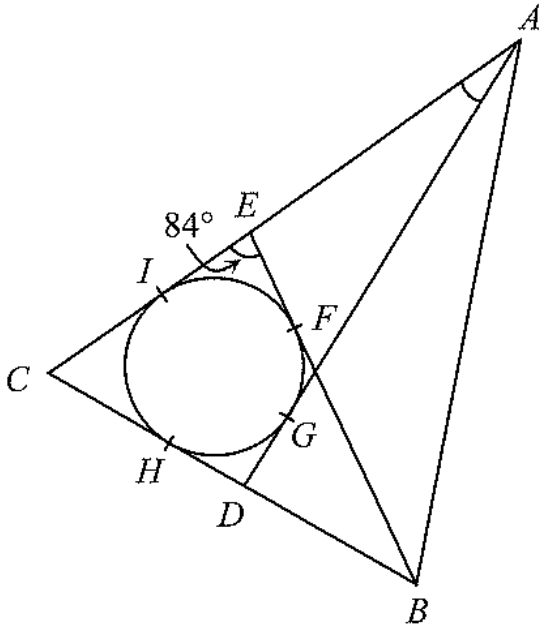
A. 90°.

B. 102°.

C. 104°.

D. 114°.

36. In the figure, BE, AD, BC and AC are the tangents to the circle at F, G, H and I respectively. It is given that BE is the angle bisector of $\angle ABC$ and $AE = BE$. If $\angle BEC = 84°$ and $FG : GH = 1 : 2$, find $\angle CAD$.



A. 15°
B. 21°
C. 36°
D. 38°

END OF PAPER

2021 – 2022 2nd Term Examination

F.4 Mathematics (Compulsory Part) Paper 2

1. B	**11.** C	**21.** D	**31.** C
2. A	**12.** B	**22.** C	**32.** C
3. D	**13.** C	**23.** B	**33.** C
4. D	**14.** B	**24.** D	**34.** B
5. A	**15.** C	**25.** C	**35.** B
6. A	**16.** D	**26.** D	**36.** D
7. D	**17.** B	**27.** A	
8. A	**18.** A	**28.** C	
9. B	**19.** D	**29.** B	
10. A	**20.** A	**30.** A	