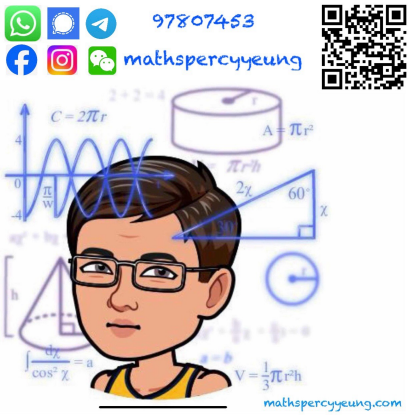
2022-2023 S4
2nd TERM EXAM
MATH CP
PAPER 2
MC



2022 – 2023
S4 Second Term Examination

MATHEMATICS Compulsory Part

PAPER 2

12th June, 2023
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. Factorize $p^2-q^2-3p-3q$.
   A. $(p-q)(p+q-3)$
   B. $(p+q)(p-q-3)$
   C. $(p-q)(p+q+3)$
   D. $(p+q)(p-q+3)$

2. $\dfrac{4}{a-4}-\dfrac{5}{a-5}=$
   A. $\dfrac{a}{(a-4)(a-5)}$.
   B. $\dfrac{a}{(a-4)(5-a)}$.
   C. $\dfrac{a+20}{(a-4)(a-5)}$.
   D. $\dfrac{a+20}{(a-4)(5-a)}$.

3. $\dfrac{27^{3m+2}}{9^{3m+1}}=$
   A. 3^{3m+4}.
   B. 3^{3m+8}.
   C. 3.
   D. 27.

4. A sum of \$20000 is deposited at an interest rate of 4% per annum for 5 years, compounded half-yearly. Find the interest obtained correct to the nearest dollar.
   A. \$2082
   B. \$2167
   C. S4380
   D. \$9605

5. Which of the following equations has irrational roots?
   I. $3x-\pi=0$
   II. $6x=11$
   III. $x^2=24$

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

6. Solve the equation $(x-k)^2=x-k$.
   A. $x=k$
   B. $x=k$ or $x=k-1$
   C. $x=k$ or $x=k+1$
   D. $x=k$ or $x=1-k$

7. In Figure 1, ΔABC and ΔPQR are two triangles, where $BC=(x+2)$ cm and $QR=5$ cm. If the area of the shaded region is 7 cm^2, then $x=$

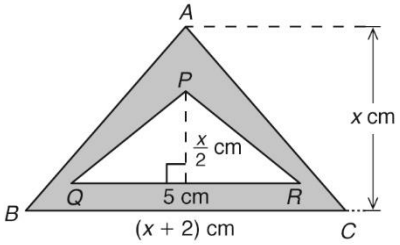


Figure 1

   A. 4.
   B. 5.
   C. 6.
   D. 7.

8. If the graph of $y=(x-2)(2x+1)+k$ does not intersect the x-axis, find the range of values of k.

A. $k>-\frac{11}{2}$

B. $k<-\frac{5}{8}$

C. $k>\frac{25}{8}$

D. $k<\frac{11}{2}$

9. If $f(x)=(x+1)(x+b)$ and $f(2)=f(5)$, find b.

A. -14

B. -8

C. 10

D. 21

10. If $f(x)=ax+1$, then $f(ax+1)=$

A. $ax+1$.

B. a^2x+a+1 .

C. $a^2x^2+2ax+1$.

D. $2ax+2$.

11. Figure 2 shows the graph of $y=-x^2+3x+4$ which cuts the y-axis at C. Find the area of rectangle $OABC$.

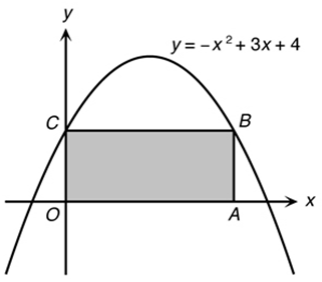


Figure 2

A. 6 sq. units

B. 9 sq. units

C. 12 sq. units

D. 16 sq. units

12. Figure 3 shows a graph of quadratic function. Which of the following functions may represent the given graph?

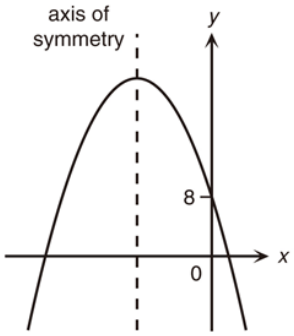


Figure 3

A. $y=-(x+4)^2+24$

B. $y=-(x-4)^2+24$

C. $y=-x^2+7x-8$

D. $y=x^2+9x+8$

13. When a polynomial $f(x)$ is divided by $4x^2-5x+1$, the quotient and the remainder are $4x+3$ and $2-6x$ respectively. Find $f(x)$.

A. $16x^3-17x^2-17x+5$

B. $16x^3-8x^2-17x+5$

C. $16x^3-8x^2-17x-5$

D. $16x^3-20x^2-17x+2$

14. Let $f(x)=x^3+ax^2+bx+1$. When $f(x)$ is divided by $x-2$, the remainder is 15. Find the value of $2a+b$.

A. 1

B. 3

C. 5

D. 7

15. Let $f(x)=ax^2+3x-5$. If $x-1$ is a factor of $f(x)$, find $f(-2)$.

A. -3

B. -1

C. 0

D. 4

16. In Figure 4, AC and BD intersect at a point on the x-axis. If the equation of AC is $x+y-1=0$, find the equation of BD.

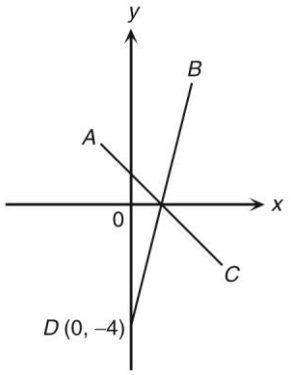


Figure 4

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

17. If $P(1,-3)$ lies on the straight line $L: x+y+c=0$, find the y-intercept of L.
A. -4
B. -2
C. 2
D. 4

18. Refer to Figure 5, find the equation of the altitude of BC in ΔABC.

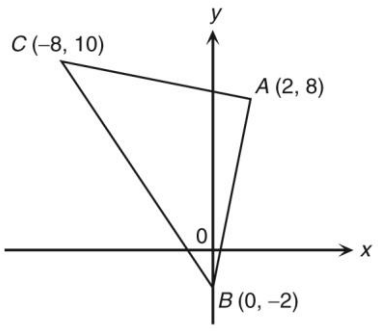
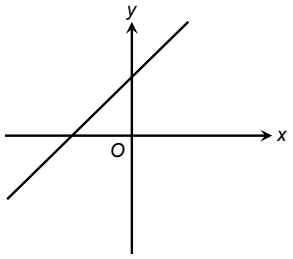
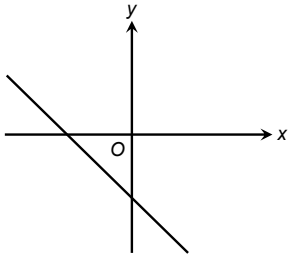


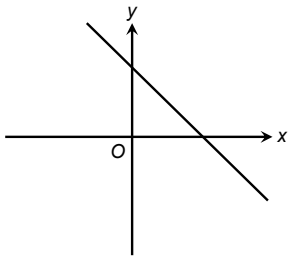
Figure 5

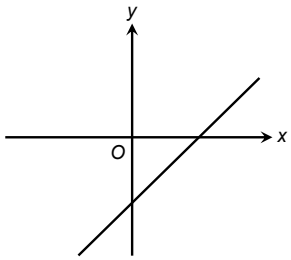
A. $2x-3y+20=0$
B. $5x-y-2=0$
C. $x+5y-42=0$
D. $x-y+6=0$

19. If $a>0$ and $b<0$, which of the following graphs may represent the straight line $\frac{x}{a}+\frac{y}{b}+1=0$?

A.


B.


C.


D.


20. In Figure 6, O is the centre of circle ABC. Express z in terms of x and y.

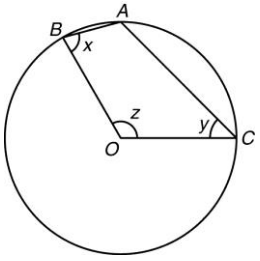


Figure 6

A. $x+y$
B. $180°-(x+y)$
C. $360°-(x+y)$
D. $360°-2(x+y)$

21. In Figure 7, AD is the diameter of the semi-circle with centre O. AC and BD intersect at E and $AB // OC$. If $\angle AEB = 72°$, find $\angle ADB$.

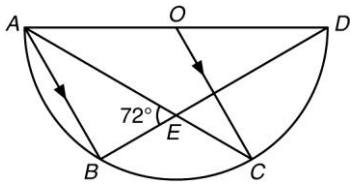


Figure 7

A. 18°
B. 36°
C. 48°
D. 54°

22. In Figure 8, O is the centre of circle ABC. $\angle AOC = 160°$ and $AB = BC$. Find x.

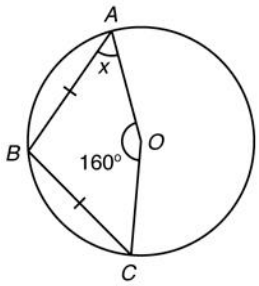


Figure 8

A. 20°
B. 30°
C. 40°
D. 50°

23. In Figure 9, CD is a diameter of circle CDE with centre O. AED and BCD are straight lines and $\angle ADB = 30°$. Find x.

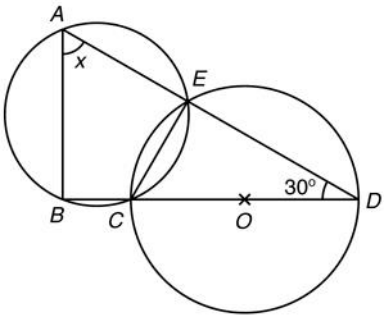


Figure 9

A. 30°
B. 45°
C. 60°
D. 70°

24. In Figure 10, $\overset{\frown}{AB} : \overset{\frown}{BC} = 3:2$. It is given that $\angle BAD = 52°$ and $\angle CBD = 24°$. Find $\angle ADB$.

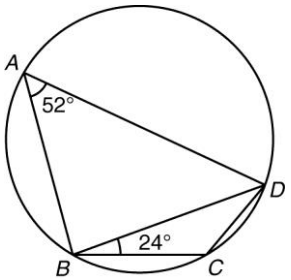


Figure 10

A. 28°
B. 36°
C. 38°
D. 42°

Section B

25. If α and β are the roots of the quadratic equation $x^2 - 5x + p = 0$, then $\alpha^2 + 5\beta =$

A. $10 - p$.

B. $15 - p$.

C. $20 - p$.

D. $25 - p$.

26. In Figure 11, the graph of $y = -x^2 + 8x + 9$ cuts the x-axis at A and B. C is a moving point on the curve above the x-axis. Find the maximum possible area of ΔABC.

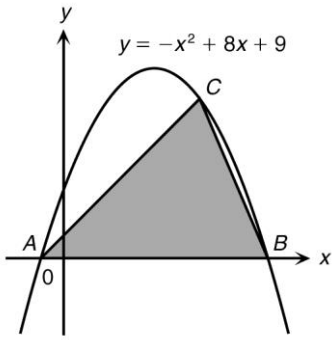


Figure 11

A. 25 sq. units

B. 100 sq. units

C. 125 sq. units

D. 150 sq. units

27. Given that the H.C.F. and L.C.M. of two expressions are $3ab^3c^2$ and $12a^2b^6c^3$ respectively. If the first expression is $3a^2b^6c^2$, then the second expression is

A. $6ab^3c^3$.

B. $6a^2b^6c^2$.

C. $12ab^3c^3$.

D. $12a^2b^6c^2$.

28. If $49^{x+1} = 7^{2x-1} + 342$, then $x =$

A. -1 .

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

C. $\frac{1}{4}$.

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

29. Solve the exponential equation $6^x + 6^{x-2} = 2$, correct to 3 significant figures.

A. $x = -1.63$

B. $x = -1.27$

C. $x = 0.372$

D. $x = 2.19$

30. For $b > 1 > a > 0$, which of the following must be true?

I. $\log(ab) > 0$

II. $\log\left(\frac{b}{a}\right) > 0$

III. $(\log a)(\log b) < 0$

A. I only

B. III only

C. I and III only

D. II and III only

31. If $\log(x + y) = \log x + \log y$, then

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

B. $x = \frac{y}{y+1}$.

C. $x = y^2$.

D. $x = y$.

32. It is given that $(5+2i)+(-7+3i)=(6-xi)-(y-3i)$, find the values of the real numbers x and y.

A. $x=-2,\ y=8$

B. $x=5,\ y=11$

C. $x=8,\ y=8$

D. $x=8,\ y=-2$

33. Solve the quadratic equation $(3+x)(1-x)=5$.

A. $x=-1\pm i$

B. $x=-1\pm 2i$

C. $x=1\pm 2i$

D. $x=1\pm i$

34. Given that the simultaneous equations $\begin{cases} kx^2-3y^2=5 \\ y=x-1 \end{cases}$ have two real solutions, find the range of values of k.

A. $k>-\frac{15}{8}$

B. $k<-\frac{15}{8}$

C. $k>\frac{15}{8}$

D. $k<\frac{15}{8}$

35. In Figure 12, ADE is a straight line. AC and BD intersect at F. It is given that $\angle BAC=\angle BDC=62°$, $\angle DCF=14°$, $\angle BCF=69°$ and $\angle CED=76°$. Which of the following must be true?

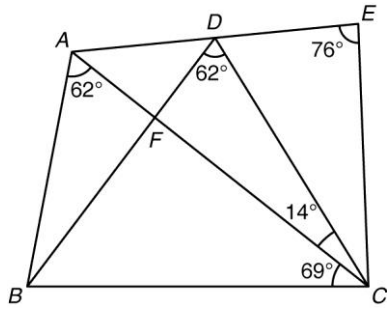


Figure 12

I. A, B, C and D are concyclic.

II. C, E, D and F are concyclic.

III. $\angle DCE=55°$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

36. In Figure 13, CA and CD are tangents to the circle at B and D respectively. DEA is a straight line. If $\angle EAB=40°$ and $\angle DCB=30°$, then $\angle EBA=$

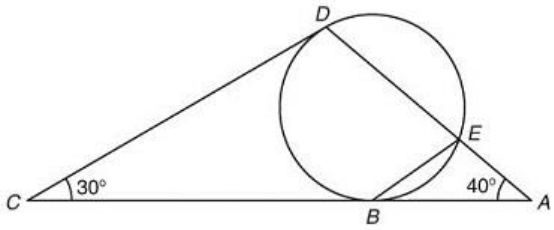


Figure 13

A. $30°$.

B. $35°$.

C. $40°$.

D. $45°$.

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