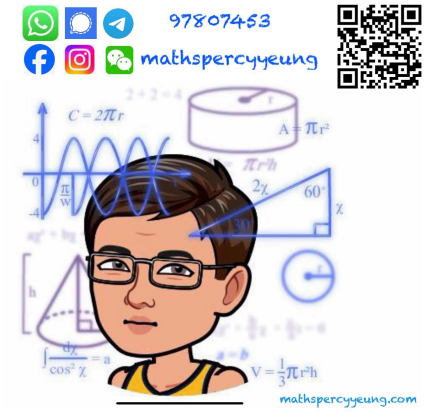
2022-2023 S4
1st TERM EXAM
MATH CP
PAPER 2

MC



2022 – 2023
S4 First Term Examination

MATHEMATICS Compulsory Part

PAPER 2

9th January, 2023
9:45 am – 10:30 am (45 minutes)
Total Marks: 27

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 18 questions in Section A and 9 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. Simplify $(\frac{a^4b^{-4}}{a^{-1}b^{-5}})^2$.
   A. $a^{10}b^2$
   B. a^6b^{18}
   C. a^6b^3
   D. a^8b^3

2. If $m(m-a)=a(1-m)$, then $a=$
   A. m.
   B. $2m$.
   C. m^2.
   D. $\frac{m^2+m}{2}$.

3. $\alpha^2-\alpha-\beta^2+\beta=$
   A. $(\alpha-\beta)(\alpha+\beta-1)$.
   B. $(\alpha+\beta)(\alpha-\beta-1)$.
   C. $(\alpha-\beta)(\alpha+\beta+1)$.
   D. $(\alpha-\beta)(\alpha-\beta+1)$.

4. Let c be a constant. Solve the equation $(x-c)(x-4c)=(3c-x)(x-4c)$.
   A. $x=2c$
   B. $x=3c$
   C. $x=c$ or $x=3c$
   D. $x=2c$ or $x=4c$

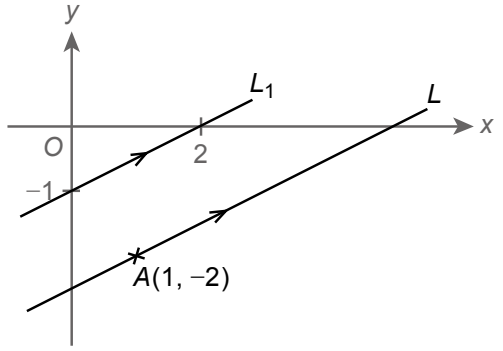
5. If two unequal integers x and y are divisible by 9, which of the following must be divisible by 81?
   I. $3(x+y)$
   II. $7xy$
   III. $(2x+y)^2$

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

6. $0.\dot{6}3\dot{6}=$
   A. $\frac{7}{11}$.
   B. $\frac{159}{250}$.
   C. $\frac{191}{300}$.
   D. $\frac{212}{333}$.

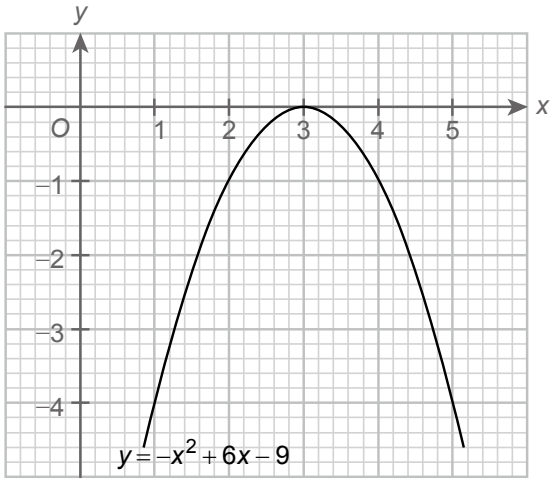
7. For $y=\frac{1}{\sqrt{2+7x}}$, y is a function of x. Which of the following is the domain of the function?
   A. All real numbers
   B. $x\neq-\frac{2}{7}$
   C. $x<-\frac{2}{7}$
   D. $x>-\frac{2}{7}$

8. In the figure, $L_1 // L$ and the x-intercept and y-intercept of L_1 are 2 and -1 respectively. Find the equation of the straight line L in the figure.



   A. $x-2y-5=0$
   B. $x+2y+3=0$
   C. $2x-y-4=0$
   D. $2x+y=0$

9. The figure shows the graph of $y=-x^2+6x-9$. Find the axis of symmetry of the graph.

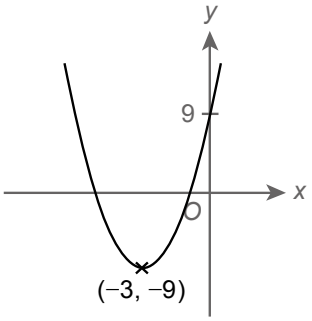


A. $y=0$
B. $y=3$
C. $x=0$
D. $x=3$

10. If $f(x)=\dfrac{x}{x+1}$, then $f(x+1)\cdot f(x+2)=$

A. $\dfrac{x+2}{x+3}$.
B. $\dfrac{x+1}{x+2}$.
C. $\dfrac{x+1}{x+3}$.
D. $\dfrac{x}{x+3}$.

11. Which of the following may represent the graph of $y=2(x-3)^2-9$?

A.


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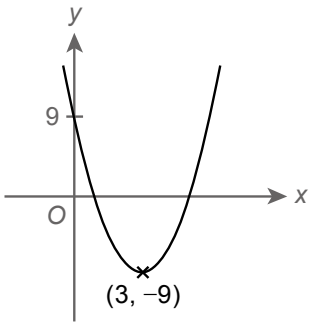

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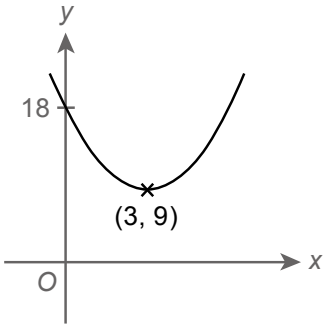

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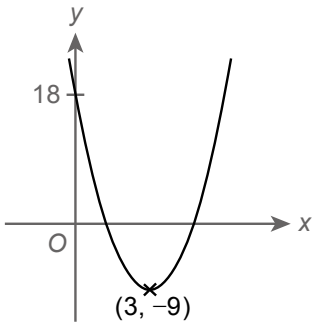
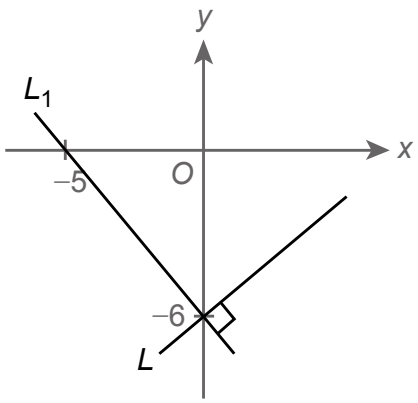


12. Which of the following represent(s) that y is a function of x?

I. $y=x^3+x+1$
II. $y^2=x$
III. $y=\sqrt{x^2+x+6}$

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

13. In the figure, $L \perp L_1$ and L_1 passes through the point $(-5,0)$ and $(0,-6)$. Find the equation of the straight line L in the figure.



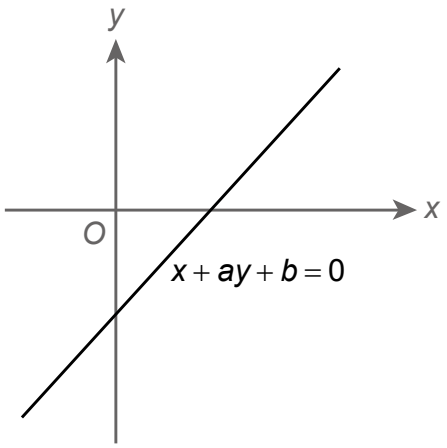
A. $5x-6y+36=0$
B. $5x-6y-36=0$
C. $6x-5y+30=0$
D. $6x-5y-30=0$

14. When x^3+x-1 is divided by x, the remainder is
A. -3.
B. -1.
C. 1.
D. 3.

15. Let h and k be real constants such that $hk<0$. Which of the following statements about the graph of $y=(h-x)(k-x)$ are true?
I. The graph opens upwards.
II. The graph has two x-intercepts.
III. The y-intercept of the graph is positive.

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

16. In the figure, the equation of the straight line is $x+ay+b=0$.



Which of the following must be true?
I. $a>0$
II. $b<0$
III. $ab>0$

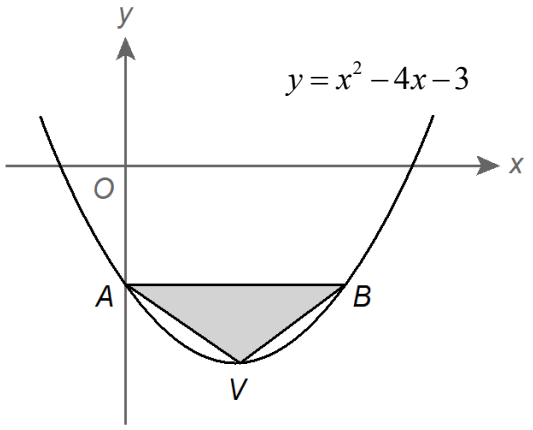
A. I and II only
B. I and III only
C. II and III only
D. None of the above

17. Let $g(x)=x^2+ax+b$, where a and b are constants. If $g(x)$ is divisible by $x+2a$, find the remainder when $g(x)$ is divided by $x-2a$.
A. $-2a^2$
B. 0
C. $2a^2$
D. $4a^2$

18. If a polynomial $f(x)$ is divisible by $x+4$, which of the following must be a factor of $f(x-3)$?
A. x
B. $x+1$
C. $x+2$
D. $x+3$

Section B

19. In the figure, the graph of $y = x^2 - 4x - 3$ cuts the y-axis at A. V is the vertex of the graph and AB is parallel to the x-axis. Find the area of ΔVAB.



A. 7 square units
B. 8 square units
C. 10.5 square units
D. 17.5 square units

20. Find a quadratic equation in x with the roots $3+\sqrt{11}$ and $3-\sqrt{11}$.
A. $x^2 + 6x - 2 = 0$
B. $x^2 - 6x - 2 = 0$
C. $x^2 + 2x + 6 = 0$
D. $x^2 + 2x - 6 = 0$

21. $\dfrac{1}{4-\sqrt{7}} - \dfrac{1}{4+\sqrt{7}} =$
A. $-\dfrac{2\sqrt{7}}{9}$.
B. $\dfrac{2\sqrt{7}}{9}$.
C. $-\dfrac{8}{9}$.
D. $\dfrac{8}{9}$.

22. If α and β are the roots of the quadratic equation $2x^2 - 4x + 3 = 0$, which of the following is a quadratic equation with the roots $\alpha - 1$ and $\beta - 1$?
A. $2x^2 + 2x - 1 = 0$
B. $2x^2 - 2x + 1 = 0$
C. $2x^2 - 1 = 0$
D. $2x^2 + 1 = 0$

23. If $\alpha \neq \beta$ and $\begin{cases} 3\alpha^2 - 5\alpha - 8 = 0 \\ 3\beta^2 - 5\beta - 8 = 0 \end{cases}$,
then $\dfrac{1}{\alpha} + \dfrac{1}{\beta} =$
A. $-\dfrac{3}{5}$.
B. $-\dfrac{5}{3}$.
C. $-\dfrac{5}{8}$.
D. $-\dfrac{8}{5}$.

24. Simplify $\left(\dfrac{1}{2a} + \dfrac{1}{3b}\right) \div \dfrac{3}{3b^2 + ab - 2a^2} \times \dfrac{15ab}{9b^2 - 4a^2}$.
A. $\dfrac{5(b-a)}{3(3b+2a)}$
B. $\dfrac{5(b+a)}{3(3b+2a)}$
C. $\dfrac{5(b-a)}{6}$
D. $\dfrac{5(b+a)}{6}$

25. Which of the following statements about the graph of $y = 2x^2 - 8x + 17$ is true?
A. The graph opens downwards.
B. The y-intercept of the graph is 9.
C. The axis of symmetry is $x = 2$.
D. The graph intersects the x-axis.

26. Find the H.C.F. and L.C.M. of $p^2q^4r^3$, pq^3r^5 and p^3q^2r.

A. H.C.F. $= pq^2r$, L.C.M. $= p^3q^4r^5$

B. H.C.F. $= p^3q^4r^5$, L.C.M. $= pq^2r$

C. H.C.F. $= pq^2r^3$, L.C.M. $= p^3q^4r^5$

D. H.C.F. $= p^3q^4r^5$, L.C.M. $= pq^2r^3$

27. Let P and Q be constants. If $\frac{9x+3}{(x+7)(x-8)} \equiv \frac{P}{x+7} + \frac{Q}{x-8}$, find the value of P and Q.

A. $P = 9,\ Q = 3$

B. $P = 3,\ Q = 9$

C. $P = 4,\ Q = 5$

D. $P = 5,\ Q = 4$

END OF PAPER