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2017 - 2018

F.4 First Term Examination

MATHEMATICS Compulsory Part
PAPER 2

3rd January, 2018

9:30 am – 10:15 am

Time Allowed：45 minutes

INSTRUCTIONS

1. Read carefully the instructions on the Answer Sheet. 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.

The diagrams in this paper are not necessarily drawn to scale.
Choose the best answer for each question.

Section A   (20 marks)

1. Which of the following is FALSE?

    A. All recurring decimals are irrational numbers.
    B. All integers are rational numbers.
    C. All irrational numbers are real numbers.
    D. Zero is a non-positive number.

2. $\dfrac{(a^2b^{-3})^2}{a^{-2}b} =$

    A. $\dfrac{a^2}{b^7}$.

    B. $\dfrac{a^2}{b^5}$.

    C. $\dfrac{a^6}{b^2}$.

    D. $\dfrac{a^6}{b^7}$.

3. Solve $x(2x+3) = x(3x-4)$.

    A. $x = 0$
    B. $x = 0$ or $x = 7$
    C. $x = -\dfrac{3}{2}$ or $x = \dfrac{4}{3}$
    D. $x = 0$ or $x = -\dfrac{3}{2}$ or $x = \dfrac{4}{3}$

4. $hl - kl + hm - km - hn + kn =$

    A. $(h+k)(l-m+n)$.
    B. $(h+k)(l+m-n)$.
    C. $(h-k)(l-m+n)$.
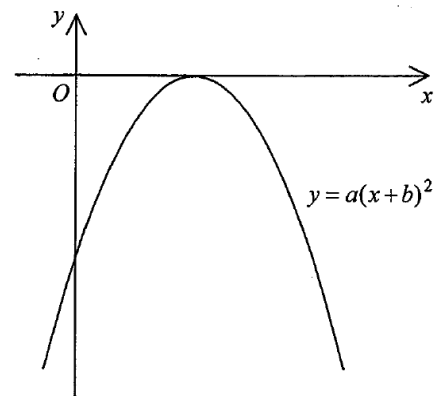   D. $(h-k)(l+m-n)$.

5. If p and q are constants such that $x^2 + p \equiv (x+2)(x+q) + 10$, then $p =$

    A. -4.
    B. -2.
    C. 6.
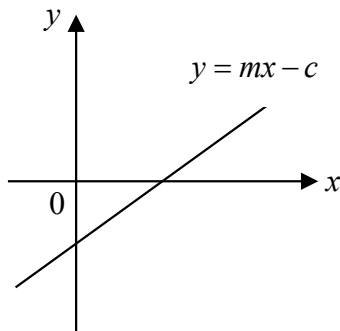   D. 10.

6. The figure shows the graph of $y = a(x+b)^2$, where a and b are constants. Which of the following is true?

    A. $a > 0$ and $b > 0$
    B. $a > 0$ and $b < 0$
    C. $a < 0$ and $b > 0$
    D. $a < 0$ and $b < 0$

7. In the figure, the equation of the straight line is $y = mx - c$. Which one of the following is true?

A. $m > 0$ and $c > 0$
B. $m > 0$ and $c < 0$
C. $m < 0$ and $c < 0$
D. $m < 0$ and $c > 0$

8. If $a > b$ and $k < 0$, which of the following must be true?
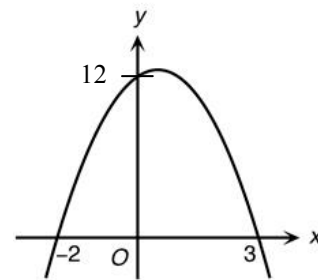
I. $a^2 > b^2$
II. $a + k > b + k$
III. $\dfrac{a}{k^2} > \dfrac{b}{k^2}$

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

9. If n is a positive integer, which of the following numbers must be odd?

I. 2^{2n+1}
II. $3(2^n)$
III. $(2n+1)^2$

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

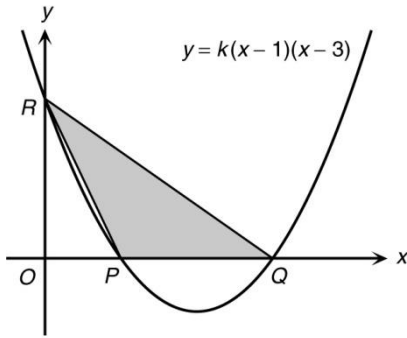**10.** Which of the following equations may be represented by the graph below?

A. $y = (x+2)(x-3)$
B. $y = -12(x+2)(x-3)$
C. $y = -2(x-2)(x+3)$
D. $y = -2(x+2)(x-3)$

11. $\dfrac{x^2 - y^2}{x^2 - 2xy + y^2} =$

A.   1.
B. $\dfrac{y-x}{x+y}$.
C. $\dfrac{x+y}{x-y}$.
D. $\dfrac{x+y}{y-x}$.

12. In the figure, the graph of $y = k(x-1)(x-3)$, where k is a constant, cuts the x-axis at P and Q, and the y-axis at R. If the area of $\triangle PQR$ is 12 sq. units, find the value of k.

A. 2
B. 4
C. 6
D. It cannot be determined.

13. The equation of the line passing through $(1, -1)$ and perpendicular to the x-axis is

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

14. Find the quotient when $2x^3 + x^2 + x - 6$ is divided by $x - 3$.

A. $2x^2 - 5x + 16$
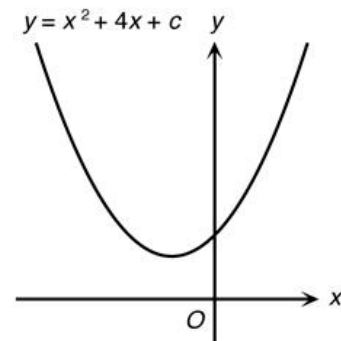B. 60
C. $2x^2 + 7x + 22$
D. $2x^2 - 7x + 22$

15. If $3x^4 + 5x^3 - kx - 12$ is divisible by $x + 1$, find the value of k.

A. 14
B. 4
C. –4
D. –14

16. When a polynomial $P(x)$ is divided by $(5x-3)$, the remainder is –7. Which of the following is divisible by $(3-5x)$?
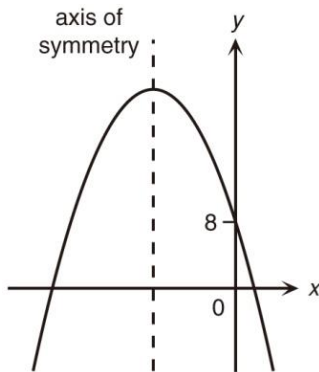
A. $-P(x-7)$
B. $-P(x+7)$
C. $P(x)-7$
D. $P(x)+7$

17. The figure shows the graph of $y = x^2 + 4x + c$. Which of the following is a possible value of c?
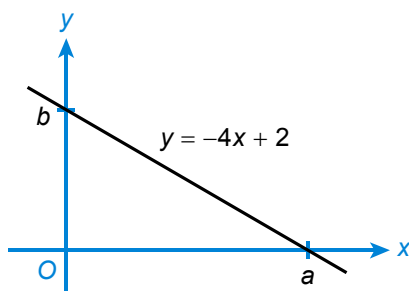

A. 5
B. 4
C. 0
D. –4

18. The figure shows a graph of quadratic function. Which of the following functions may represent the given graph?

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

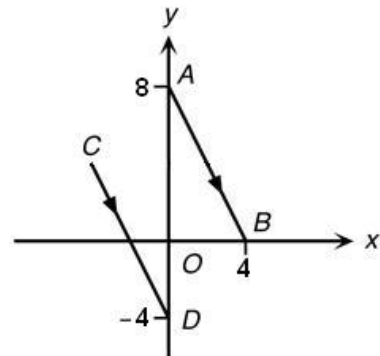B. $y = -x^2 + 7x - 8$

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

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

19. The figure shows the graph of the equation $y = -4x + 2$.

Find the values of $a - b$.

A. 2

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

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

D. -2

20. In the figure, CD is parallel to AB. Find the equation of CD.

A. $2x + y - 4 = 0$

B. $2x + y + 4 = 0$

C. $4x + y + 2 = 0$

D. $4x + y - 2 = 0$

Section B (7 marks)

21. Find the H.C.F. and L.C.M. of $5(7x-2)^2$, $6(7x-2)(x+6)$ and $10(x+6)^2$.

	H.C.F.	L.C.M.
A.	1	$30(7x-2)(x+6)$
B.	1	$30(7x-2)^2(x+6)^2$
C.	30	$(7x-2)(x+6)$
D.	30	$(7x-2)^2(x+6)^2$

22. The H.C.F. and L.C.M. of three expressions are a^2b^2c and $18a^4b^6c^4$ respectively. Two of the expressions are $2a^2b^3c^4$ and $6a^3b^2c^2$. The third expression is

    A. $18a^4b^6c$.
    B. $18a^3b^2c^4$.
    C. $9a^4b^6c$.
    D. $9a^3b^2c^4$.

23. $\dfrac{6}{x^2-9} - \dfrac{5}{x^2+x-6} =$

    A. $\dfrac{1}{(x-2)(x+3)}$.

    B. $\dfrac{1}{(x+2)(x-3)}$.

    C. $\dfrac{1}{(x-2)(x-3)}$.

    D. $\dfrac{x-27}{(x-2)(x+3)(x-3)}$.

24. If α and β are the roots of $2x^2 - 3x - 4 = 0$, then $\alpha^2 + 3\alpha\beta + \beta^2 =$

    A. $\dfrac{1}{4}$.

    B. $4\dfrac{1}{4}$.

    C. 5.
    D. 8.

25. If $\begin{cases} a^2 + 3a + k = 0 \\ b^2 + 3b + k = 0 \end{cases}$, $a \neq b$ and $a^2 + b^2 = 11$, then $k =$

    A. −1.
    B. −3.
    C. −5.
    D. −7.

26. It is given that $f(x) = 4x^2 - 4x + 13$. Which of the following must be true?

    I.   The minimum value of $f(x)$ is 12.

    II. The axis of symmetry of the graph of $y = f(x)$ is $x = -\dfrac{1}{2}$.

    III. The coordinates of the vertex of the graph of $y = f(-x)$ are $\left(-\dfrac{1}{2}, 12\right)$.

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

27. It is given that the perimeters of two rectangles are 36 m and 44 m respectively. What is the difference between their maximum areas?

    A. 40 m^2
    B. 64 m^2
    C. 81 m^2
    D. 121 m^2

END OF PAPER