

绝密★启用前

7-8-插班测试数学（英文）

试题整理：新航道国际备考教研中心

(Time: 80 minutes; Total: 100 points)

姓名：_____

分数：_____

注意事项：

1. 答题时，考生务必在相应位置写好自己的姓名；
2. 答题时，必须在答题卷上写出相应的计算步骤或主要步骤。

一、 Multiple choice questions. (8 * 2 = 16 points)

1. Among real numbers $\sqrt{2}$, $0.\dot{3}4$, π , $5\frac{1}{6}$ and $0.7878878887\dots$, there is/are () irrational numbers.
(A) one (B) two (C) three (D) four
2. In the following figures, the one that must have both central symmetry and reflection symmetry is ()
(A) an angle (B) an equilateral triangle
(C) a regular dodecagon (D) a regular n-sided figure
3. If the product of the polynomials $x^2 - 2x + 3$ and $x^2 + 2x - a$ does not contain a term of x , then the value of a is ()
(A) 3 (B) -3 (C) 4 (D) -4

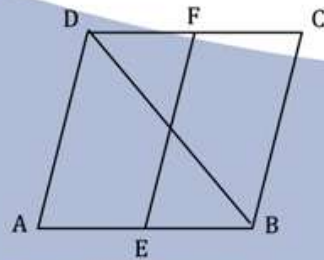
4. If point P ($a - b$, $a + b$) is in the third quadrant, then the result of simplifying

$$|a - b| - |a + b| \text{ is ()}$$

- (A) $2a$ (B) $2b$ (C) $-2a$ (D) $-2b$

5. As shown in the diagram, given that $AD \parallel EF \parallel BC$, $AB \parallel CD$, and $\angle ABD = \angle ADB$, then in the diagram, in addition to $\angle ABD$, there are () other angles equal to $\angle ADB$.

- (A) 2 (B) 3
(C) 4 (D) 12



6. Given $\frac{5x+1}{(x-1)(x-2)} = \frac{a}{x-1} + \frac{11}{x-2}$, then the value of a is ()

- (A) -6 (B) -3 (C) 3 (D) 6

7. The ratios of the length of three segments are given below. The set that can form a triangle is ()

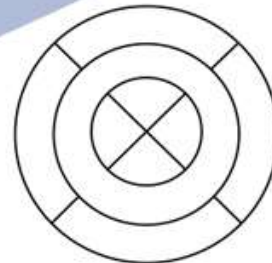
- (A) $1:2:3$ (B) $2:2:4$ (C) $1:3:5$ (D) $4:5:6$

8. The distance between A and B is m metres. A messenger planned to take t hours to walk from A to B to deliver a message. Due to some reason, he now must reach B n hours ahead of the plan. Therefore, he should walk () more metres per hours.

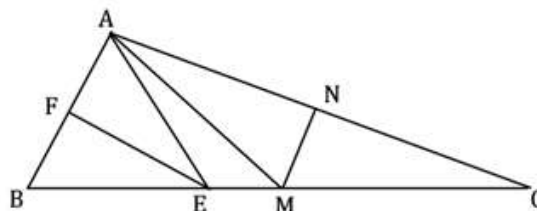
- (A) $\frac{m}{t-n}$ m (B) $\frac{mn}{t-n}$ m (C) $\frac{mn}{nt-t^2}$ m (D) $\frac{mn}{t^2-nt}$ m

二、 Fill in the blanks. (12 * 2 = 24 points)

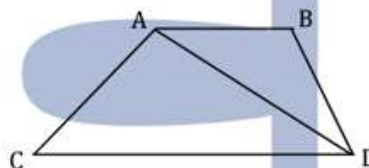
9. Factorise: $x^3 - 2x^2 - 3x =$ _____.
10. If $2x^m y^3$ and $-7xy^{2n-1}$ are like terms, then $m+n=$ _____.
11. The algebraic expression representing “the sum of -3 and 6 times the square of a” is _____.
12. In $\triangle ABC$, if $\angle A:\angle B:\angle C=2:4:6$, then $\angle C=$ _____ $^\circ$.
13. The coordinates of the point symmetric to point P (3, 4) about the line $y=-2$ are _____.
14. If the value of the algebraic expression $2a^2 - 3a + 1$ is 6, then the value of $4a^2 - 6a + 5$ is _____.
15. For this diagram, the number of lines of symmetry is _____; the order of rotational symmetry is _____.



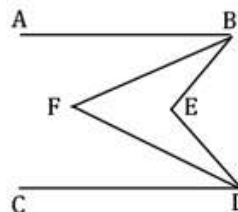
16. As shown in the diagram, in $\triangle ABC$, $\angle BAC = 106^\circ$, EF and MN are the perpendicular bisectors of AB and AC . The $\angle EAM$ equals _____.



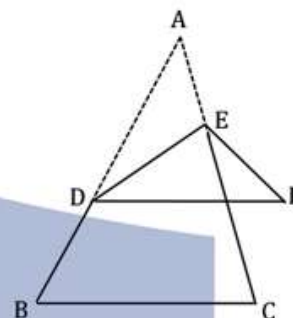
17. As shown in the diagram, $AB \parallel CD$, DA bisects $\angle BDC$, and $\angle ADC : \angle B = 1 : 3$; then $\angle BAD =$ _____ degrees.



18. As shown in the diagram, $AB \parallel CD$, BF bisects $\angle ABE$, DF bisects $\angle CDE$, and $\angle BED = 100^\circ$, then $\angle BFD =$ _____ degrees.



19. As shown in the diagram, in $\triangle ABC$, D and E are points on the sides AB and AC , respectively. Folding the triangular piece of paper along DE , point A reaches the position of point F . If $DF \parallel BC$, $\angle B = 60^\circ$ and $\angle CEF = 20^\circ$, then $\angle A =$ _____ degrees.



20. If $a - \frac{1}{a} = 3$, then $a^2 + \frac{1}{a^2} =$ _____.

三、 **Questions that require solution.**

21. Calculate: (5 * 3 = 15 points)

(1) $(a + b - c)(a - b - c)$

(2) $\frac{1}{x-2} + \frac{1}{x^2-5x+6}$

(3) $|\sqrt{2} - \sqrt{6}| + |\sqrt{2} - 1| + |\sqrt{6} - 3|$

(4) $\left[(-3xy^4)^2 \cdot x^3 - x^2y^2 \cdot (3xy)^3 \right] \div 9x^5y^3$

(5) $\left(-2\frac{1}{3}\right)^{-1} \times \left(-\frac{6}{7}\right)^{-2} + \left(-\frac{2}{3}\right)^{-2} \times \left(-\frac{1}{3}\right)^0$

22. Simplify : (5 * 3 = 15 points)

(1) $(16y^8)^{\frac{3}{4}}$

(2) $\frac{x^2 - 16}{x^2 - 6x + 8}$

(3) First simplify, and then evaluate: $x - 2\left(\frac{1}{4}x - \frac{1}{3}y^2\right) + \left(-\frac{3}{2}x + \frac{1}{3}y^2\right)$, for

$$x = \frac{3}{2} \text{ and } y = -2.$$

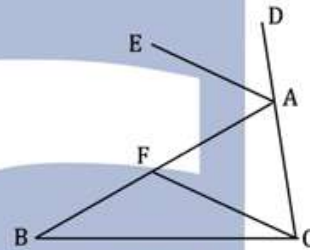
(4) Given $x + y = 4$ and $xy = 1$, find the value of the algebraic expression

$$(x^2 + 1)(y^2 + 1)$$

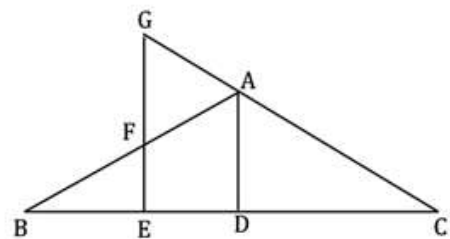
(5) Given $x^2 - 4x + y^2 - 6y + 13 = 0$, find the value of x and y .

23. The area of a square and a circle are both 4. Compare the size of the perimeter of the square and that of the circumference of the circle. (6 points)

24. As shown in the diagram, AE bisects $\angle BAD$, and $CF \parallel AE$. If $\angle BAC = 70^\circ$ and $\angle B = 30^\circ$, find $\angle BCF$. (8 points)



25. As shown in the diagram, in $\triangle ABC$, $AD \perp BC$ with point D being the foot of the perpendicular, point E is a point on BD , $EG \parallel AD$ intersecting AB and the extension of CA beyond A at point F and G , respectively, and $\angle AFG = \angle G$. Explain why $\triangle ABD \cong \triangle ACD$. (6 points)



26. As shown in the diagram, in $\triangle ABC$, $\angle ACB=90^\circ$, $AC = BC$, point D is any point on AB , $AE \perp AB$, $AE = BD$, and DE and AC intersect at point F .
Determine the shape of $\triangle CDE$. Give your reason. (10 points)

