

2021 学年嘉定区第二次质量调研数学试卷参考答案及评分意见

一、 1. C; 2. B; 3. D; 4. C; 5. D; 6. A.

二、 7. $2 - 4x$; 8. $a(a - 9)$; 9. $x > 6$; 10. 1;

11. $2y^2 - 3y + 1 = 0$; 12. 3; 13. 2; 14. $\frac{7}{4}$;

15. $-\vec{a} - \frac{2}{3}\vec{b}$; 16. 2; 17. $\sqrt{3} + 1$; 18. $\sqrt{10}$.

三、 19. 解原式 $= 2 + \sqrt{2} - 2 + \sqrt{2} + 1 - 2\sqrt{2}$ 8'
 $= 1$ 2'

20. 解 由②得: $(x + 6y)(x - y) = 0$ 2'
 $\therefore (x + 6y) = 0$ 或 $(x - y) = 0$
 2'

原方程组可变为: $\begin{cases} x - 2y = 8 \\ x + 6y = 0 \end{cases}$, $\begin{cases} x - 2y = 8 \\ x - y = 0 \end{cases}$
 2'

解这两个方程组得原方程组的解是: $\begin{cases} x_1 = 6 \\ y_1 = -1 \end{cases}$, $\begin{cases} x_2 = -8 \\ y_2 = -8 \end{cases}$... 4'

21. 解(1) $\because DE \perp AB \therefore \angle AED = 90^\circ$

在 Rt $\triangle AED$ 中, $\sin A = \frac{DE}{DA}$ 1'

$\because \sin A = \frac{3}{5} \therefore \frac{DE}{DA} = \frac{3}{5}$ 1'

$\because AE = 16 \quad DE^2 + AE^2 = DA^2 \therefore DE = 12 \quad DA = 20$ 1'

$\because BD$ 平分 $\angle ABC$, $\angle AED = \angle C = 90^\circ \therefore CD = DE$ 1'

$\therefore CD = 12$ 1'

$$(2) \text{ 由(1)得 } DA = 20 \quad \therefore AC = 32 \quad \dots\dots\dots 1'$$

$$\text{在 Rt } \triangle ACB \text{ 中, } \sin A = \frac{BC}{AB} \quad \dots\dots\dots 1'$$

$$\therefore BC^2 + AC^2 = AB^2 \quad \therefore BC = 24 \quad \dots\dots\dots 1'$$

$$\text{在 Rt } \triangle BCD \text{ 中, } \cot \angle DBC = \frac{BC}{CD} \quad \dots\dots\dots 1'$$

$$\text{又 } BC = 24 \quad CD = 12 \quad \therefore \cot \angle DBC = 2 \quad \dots\dots\dots 1'$$

22. 解(1) 由点 B(- 2, 6)在直线 $y = kx + 4$ 上

$$\therefore 6 = - 2k + 4 \quad \dots\dots\dots 1'$$

$$\therefore k = - 1 \quad \dots\dots\dots 1'$$

$$\therefore \text{直线的表达式是 } y = - x + 4 \quad \dots\dots\dots 1'$$

$$\therefore \text{点 A(2, m)在直线 } y = - x + 4 \text{ 上} \quad \therefore m = - 2 + 4 \quad \dots\dots 1'$$

$$\therefore m = 2 \quad \dots\dots\dots 1'$$

$$(2) \text{ 设所求的双曲线表达式是 } y = \frac{k}{x} (k \neq 0) \quad \dots\dots\dots 1'$$

$\therefore$ 第三象限点 C 与点 A 关于原点对称,

$$\therefore \text{点 A 的纵坐标与点 C 的纵坐标是互为相反数} \quad \dots\dots\dots 1'$$

$$\therefore \text{点 C 的纵坐标是-3} \quad \therefore \text{点 A 的坐标是(2, 3)} \quad \dots\dots\dots 1'$$

$$\therefore \text{点 A 在双曲线 } y = \frac{k}{x} \text{ 上} \quad \therefore 2 = \frac{k}{3} \quad \therefore k = 6 \quad \dots\dots\dots 1'$$

$$\therefore \text{双曲线的表达式是 } y = \frac{6}{x} \quad \dots\dots\dots 1'$$

23. 证 明 (1) $\therefore \angle BAE = \angle CAD \quad \therefore \angle BAE + \angle EAC = \angle CAD + \angle EAC$

$$\therefore \angle BAC = \angle EAD \quad \dots\dots\dots 2'$$

在 $\triangle BAC$ 和 $\triangle EAD$ 中, $\begin{cases} AB = AE \\ \angle BAC = \angle EAD \\ AC = AD \end{cases}$

$\therefore \triangle BAC \cong \triangle EAD$ 2'

$\therefore BC = DE$ 2'

(2) $\because AC = BC \therefore \angle B = \angle CAB$

$\because \angle B + \angle CAB + \angle ACB = 180^\circ \therefore \angle ACB = 180^\circ - 2\angle B$

$\because AB = AE \therefore \angle B = \angle AEB$

$\because \angle B + \angle AEB + \angle BAE = 180^\circ \therefore \angle BAE = 180^\circ - 2\angle B \cdots 1'$

$\therefore \angle ACB = \angle BAE$ 1'

$\because \angle BAE = \angle CAD \therefore \angle ACB = \angle CAD$ 1'

$\therefore AD \parallel BC$ 1'

$\because AC = BC \quad AC = AD \therefore BC = AD$ 1'

$\therefore$ 四边形 $ABCD$ 是平行四边形 1'

24. 解(1) $\because$ 抛物线 $y = ax^2 + bx + 3$ 经过点 $A(3, 0)$ 、 $B(4, 1)$ 两点

$\therefore \begin{cases} 0 = 9a + 3b + 3 \\ 1 = 16a + 4b + 3 \end{cases}$ 1'

得 $\begin{cases} a = \frac{1}{2} \\ b = -\frac{5}{2} \end{cases}$ 1'

$\therefore$ 抛物线的表达式是 $y = \frac{1}{2}x^2 - \frac{5}{2}x + 3$ 1'

(2) 联结 OB , 点 B 的坐标是 $(4, 1)$

由题意得 $S_{\triangle BOC} = \frac{1}{2} \times 4 \times 3 = 6$ 1'

$$S_{\triangle OAB} = \frac{1}{2} \times 3 \times 1 = \frac{3}{2} \dots\dots\dots 1'$$

$$\therefore S_{OABC} = S_{\triangle BOC} + S_{\triangle OAB} \dots\dots\dots 1'$$

$$\therefore S_{OABC} = 6 + \frac{3}{2} = \frac{15}{2} \dots\dots\dots 1'$$

(3) 存在 $\dots\dots\dots 1'$

由(1)可知: 对称轴 l 的表达式是直线 $x = 2.5$

$\therefore$ 点 D 与点 B 关于直线 l 对称, 点 B 的坐标是 $(4, 1)$

$\therefore$ 点 D 的坐标是 $(1, 1)$, 可以求得, $DC = AD = \sqrt{5}$,

直线 BC 的表达式是 $y = -\frac{1}{2}x + 3$, 直线 AD 的表达式是 $y = -\frac{1}{2}x + \frac{3}{2}$,

$$\therefore AD \parallel BC \dots\dots\dots 1'$$

只要 $AD = EC$, 就能得到四边形 $ADCE$ 是菱形.

设点 E 的坐标为 $(x, -\frac{1}{2}x + 3)$, 得 $\sqrt{(x - 0)^2 + (-\frac{1}{2}x + 3 - 3)^2} = \sqrt{5}$

$$\text{解得 } x = \pm 2 \text{ (负值舍去)} \dots\dots\dots 1'$$

$$\therefore \text{点 } E \text{ 的坐标为 } (2, 2) \dots\dots\dots 1'$$

$\therefore$ 在线段 BC 上存在一点 E , 使四边形 $ADCE$ 是菱形,

点 E 的坐标为 $(2, 2)$

$$25. \text{解(1)} \therefore DC \parallel AB \therefore \frac{FC}{AE} = \frac{FG}{GE} \dots\dots\dots 1'$$

$$\therefore EF \parallel AD \therefore \text{四边形 AEFD 是平行四边形} \therefore DF = AE, AD = EF$$

$$\therefore AE = x = 1 \therefore DF = 1 \therefore CD = 3 \therefore CF = 2 \dots\dots\dots 1'$$

$$\text{又 } AD = 6 \therefore EF = 6 \dots\dots\dots 1'$$

$$\therefore FG = 6 - GE \therefore \frac{2}{1} = \frac{6 - GE}{GE} \therefore GE = 2 \dots\dots\dots 1'$$

(2) ① CH : HN 的值没有变化 1'

过点 C 作 $CG \perp AB$, 垂足为 G

由题意可知 $CG = AD = 6$ $DC = AG = 3 \therefore AB = 9 \therefore GB = 6$

$\therefore \triangle CGB$ 是等腰直角三角形 $\therefore CB^2 = CG^2 + GB^2 \therefore CB = 6\sqrt{2}$...
1'

$\therefore \angle B = 45^\circ \quad \angle HEB = 90^\circ \therefore \angle EHB = 45^\circ$

$\therefore \angle B = \angle EHB \therefore HE = BE \therefore AM = BE \therefore AM = HE$

又 $AM \parallel HE \therefore$ 四边形 AMHE 是平行四边形 1'

$\therefore MH \parallel AB \therefore \triangle CNH \sim \triangle CAB$ 1'

$\therefore \frac{CH}{HN} = \frac{CB}{AB}$ 1'

$\therefore AB = 9 \therefore \frac{CH}{HN} = \frac{6\sqrt{2}}{9} = \frac{2\sqrt{2}}{3}$ 1'

(2) ②当 $3 < x < 9$ 时, 由①得 $HE = BE \therefore HE = 9 - x$

在 $Rt \triangle CDA$ 中, $\tan \angle CAD = \frac{CD}{AD} = \frac{3}{6} = \frac{1}{2}$

在 $Rt \triangle AEH$ 中, $\tan \angle HAE = \frac{HE}{AE} = \frac{9-x}{x}$

$\therefore \angle CAD = \angle HAE \therefore \frac{1}{2} = \frac{9-x}{x} \therefore x = 6$ 2'

当 $x > 9$ 时, 同理得 $BE = EH \therefore EH = x - 9 = BE$

同理 $\frac{EH}{AE} = \frac{1}{2} \therefore \frac{x-9}{x} = \frac{1}{2} \therefore x = 18$

综上所述: x 的值是 6 或 18 2'