

②综合练习(1)

1. C 2. C 3. C 4. A 5. C 6. D 7. B 8. A

9. 25 10. 50 11. 4.8 12. 280

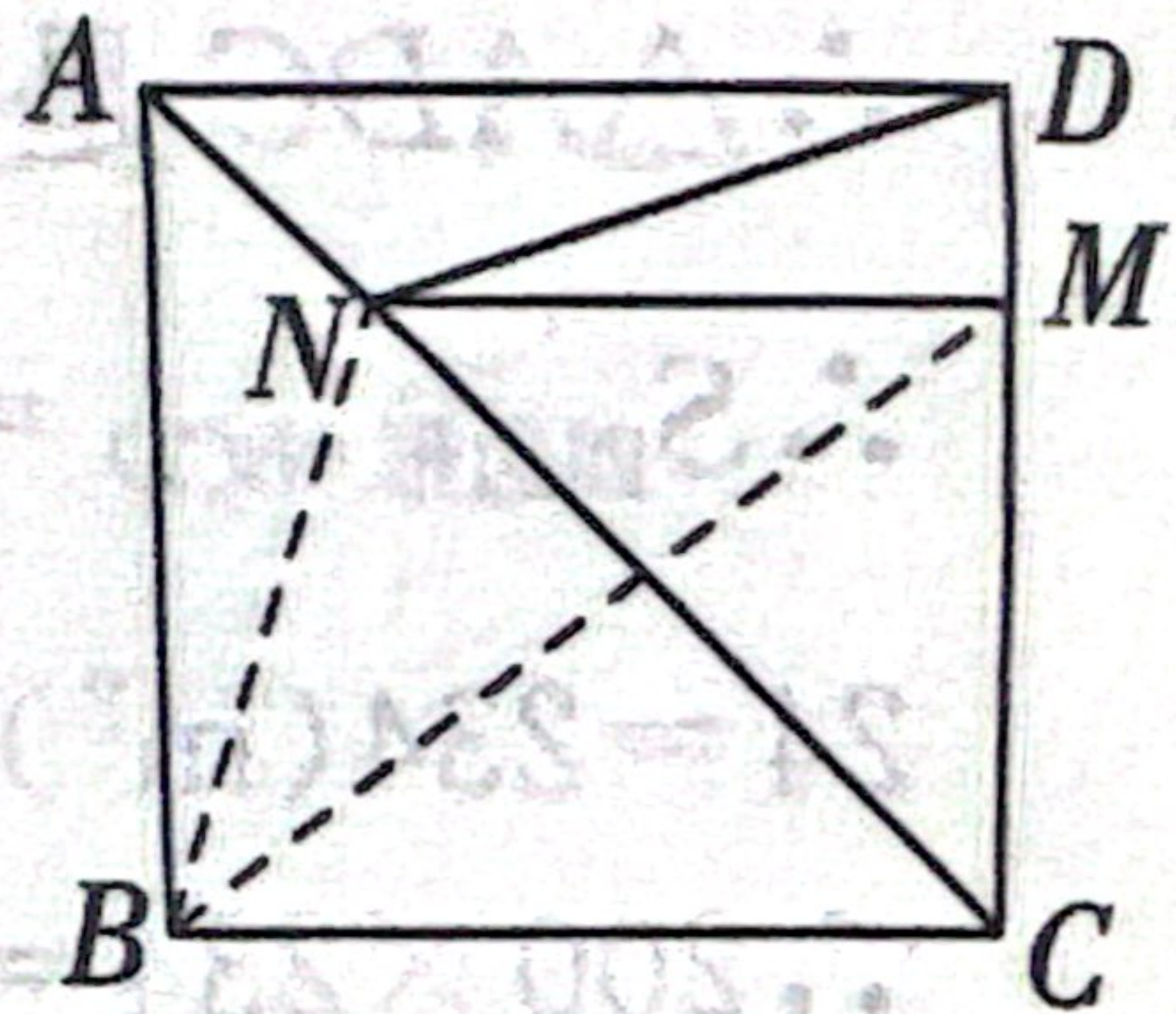
13. 10 [解析]如答图,连接 BN, BM .

$\because$ 四边形 $ABCD$ 是正方形,

$\therefore B, D$ 两点关于 AC 对称,

$\therefore BN = DN$.

$\therefore DN + MN = BN + MN \geq BM$,



第13题答图

当 B, N, M 三点共线时, $DN + MN$ 的值最小.

$$\because BC = CD = 8, DM = 2,$$

$$\therefore CM = 6.$$

在 $\text{Rt}\triangle BCM$ 中, $BM^2 = CM^2 + BC^2$,

$$\therefore BM^2 = 6^2 + 8^2 = 100,$$

$$\therefore BM = 10,$$

$\therefore DN + MN$ 的最小值为 10.

14. 解: 如答图, 连接 AC .

$$\because \angle ABC = 90^\circ, AC = (AB + 2) \text{ cm}, BC = 8 \text{ cm},$$

$$\therefore AB^2 + BC^2 = AC^2,$$

$$\text{即 } AB^2 + 8^2 = (AB + 2)^2,$$

解得 $AB = 15$,

$\therefore AB$ 段的长为 15 cm.

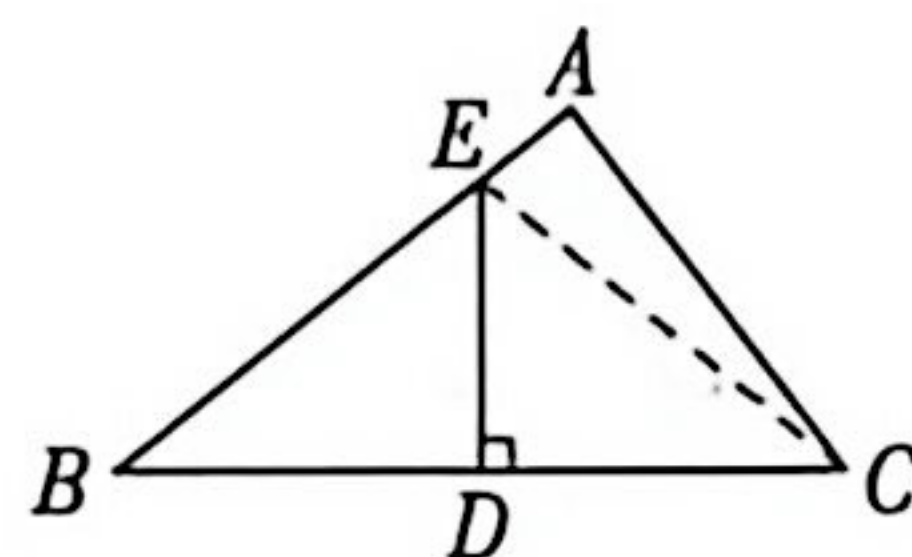
15. 解: 在 $\text{Rt}\triangle ABD$ 中, 由勾股定理, 得 $BD^2 = AB^2 - AD^2 = 170^2 - 150^2 = 6400$,

$$\therefore BD = 80 \text{ km}.$$

$$\because 80 \div 20 = 4(\text{h}),$$

$\therefore$ 台风中心经过 4 h 从点 B 移动到点 D .

16. 证明: 如答图, 连接 CE .



第 16 题答图

$\because ED$ 是线段 BC 的垂直平分线,

$$\therefore CE = BE.$$

$$\because BE^2 - EA^2 = AC^2,$$

$$\therefore CE^2 - EA^2 = AC^2, \text{ 即 } AC^2 + EA^2 = CE^2,$$

$\therefore \triangle ACE$ 是直角三角形, 且 $\angle A = 90^\circ$.

17. 解: 在 $\text{Rt}\triangle ACD$ 中, $\because \angle C = 90^\circ, AC = 12, AD = 13$,

$$\therefore CD^2 = AD^2 - AC^2 = 13^2 - 12^2 = 25,$$

$$\therefore CD = 5.$$

$\because AD$ 为边 BC 上的中线,

$$\therefore BC = 2CD = 10,$$

$$\therefore \text{在 } \text{Rt}\triangle ABC \text{ 中}, AB^2 = AC^2 + BC^2 = 12^2 + 10^2 = 244.$$

18. 解: 如答图, 连接 AC .

在 $\text{Rt}\triangle ABC$ 中, $\because \angle B = 90^\circ, AB = 20, BC = 15$,

$$\therefore AC^2 = AB^2 + BC^2 = 20^2 + 15^2 = 625,$$

$$\therefore AC = 25(\text{m}).$$

在 $\triangle ADC$ 中, $\because CD = 7, AD = 24, AC = 25$,

$$\therefore AD^2 + CD^2 = 24^2 + 7^2 = 625 = AC^2,$$

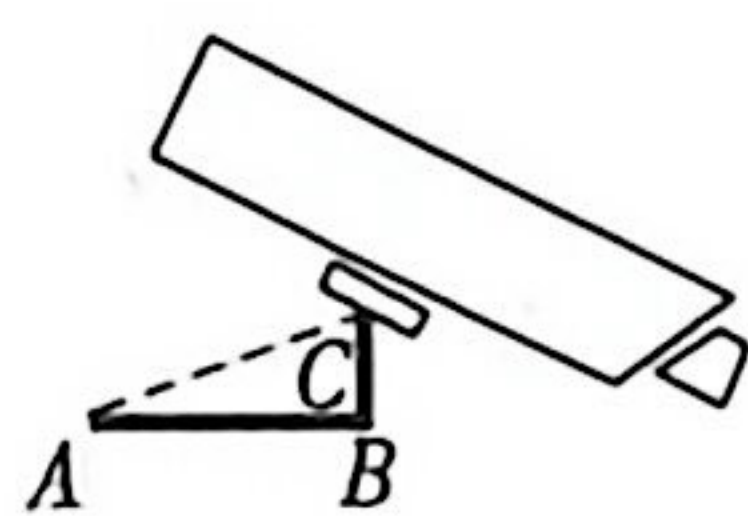
$\therefore \triangle ADC$ 是直角三角形, 且 $\angle D = 90^\circ$,

$$\therefore S_{\text{四边形}ABCD} = S_{\triangle ABC} + S_{\triangle ADC} = \frac{1}{2} \times 15 \times 20 + \frac{1}{2} \times 7 \times$$

$$24 = 234(\text{m}^2),$$

$$\therefore 200 \times 234 = 46800(\text{元}).$$

答: 学校需要投入 46 800 元.



第 14 题答图

19. 解: (1) 设 $AD = x$ cm, 则 $AB = AC = (x + 3)$ cm.

$$\because CD \perp AB,$$

$$\therefore \angle CDA = 90^\circ.$$

在 $\text{Rt}\triangle ACD$ 中, $AD^2 + CD^2 = AC^2$, 即 $x^2 + 4^2 = (x + 3)^2$,

$$\text{解得 } x = \frac{7}{6},$$

即 AD 的长为 $\frac{7}{6}$ cm.

(2) 由 (1) 可知, $AB = AD + BD = \frac{7}{6} + 3 = \frac{25}{6}(\text{cm})$.

$$\because CD \perp AB,$$

$$\therefore S_{\triangle ABC} = \frac{1}{2} AB \cdot CD = \frac{1}{2} \times \frac{25}{6} \times 4 = \frac{25}{3}(\text{cm}^2).$$

20. 解: (1) 在 $\text{Rt}\triangle MNB$ 中, $BN^2 = BM^2 - MN^2 = 150^2 - 120^2 = 8100$,

$$\therefore BN = 90 \text{ m},$$

$$\therefore AN = AB - BN = 250 - 90 = 160(\text{m}).$$

在 $\text{Rt}\triangle AMN$ 中, $AM^2 = AN^2 + MN^2 = 160^2 + 120^2 = 40000$,

$$\therefore AM = 200 \text{ m},$$

$\therefore$ 供水点 M 到喷泉 A, B 需要铺设的管道总长为 $AM + BM = 200 + 150 = 350(\text{m})$.

(2) $\because AB = 250 \text{ m}, AM = 200 \text{ m}, BM = 150 \text{ m}$,

$$\therefore AB^2 = 62500, AM^2 + BM^2 = 200^2 + 150^2 = 62500,$$

$$\therefore AM^2 + BM^2 = AB^2,$$

$\therefore \triangle ABM$ 是直角三角形, 且 $\angle AMB = 90^\circ$,

$$\therefore BM \perp AC,$$

$\therefore$ 喷泉 B 到小路 AC 的距离为 150 m.

21. (1) 证明: $\because AB = AC$,

$$\therefore \angle B = \angle C.$$

$\because$ 折叠等腰三角形纸片 ABC , 使点 C 落在边 AB 上的点 F 处,

$$\therefore \angle EFD = \angle C,$$

$$\therefore \angle B = \angle EFD.$$

$$\because FD \perp BC,$$

$$\therefore \angle BDF = 90^\circ,$$

$$\therefore \angle B + \angle BFD = 90^\circ,$$

$$\therefore \angle EFD + \angle BFD = 90^\circ,$$

$$\therefore \angle AFE = 180^\circ - (\angle EFD + \angle BFD) = 180^\circ - 90^\circ = 90^\circ.$$

(2) 解: $\because AF = 3, BF = 6$,

$$\therefore AB = AF + BF = 9 = AC.$$

设 $AE = x$, 则 $CE = 9 - x$.

$\because$ 折叠等腰三角形纸片 ABC , 使点 C 落在边 AB 上的点 F 处,

$$\therefore EF = CE = 9 - x.$$

在 $\text{Rt}\triangle AFE$ 中, $AF^2 + EF^2 = AE^2$,

$$\therefore 3^2 + (9 - x)^2 = x^2, \text{ 解得 } x = 5,$$

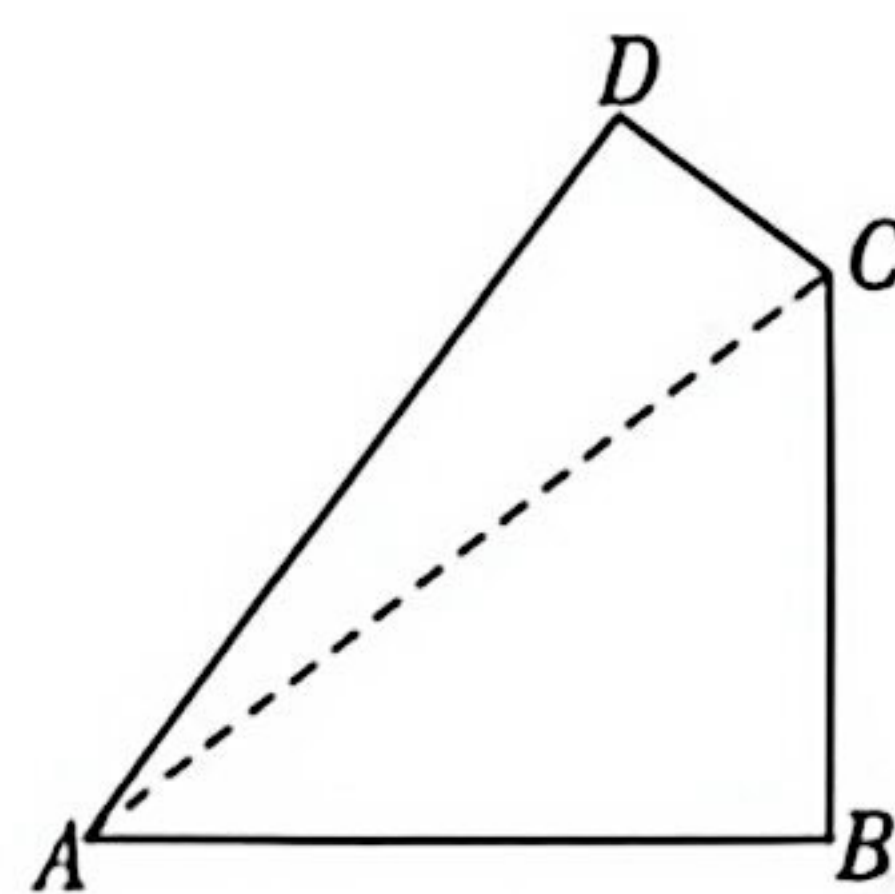
$\therefore AE$ 的长为 5.

22. 解: (1) 梯形 $ABCD$ 的面积为 $\frac{1}{2}(a+b)(a+b) = \frac{1}{2}a^2 + ab + \frac{1}{2}b^2$,

$$\text{也可以表示为 } \frac{1}{2}ab + \frac{1}{2}ab + \frac{1}{2}c^2,$$

$$\therefore \frac{1}{2}a^2 + ab + \frac{1}{2}b^2 = \frac{1}{2}ab + \frac{1}{2}ab + \frac{1}{2}c^2,$$

$$\text{即 } a^2 + b^2 = c^2.$$



第 18 题答图

(2) 设 $AB=AC=x$ km,

$\therefore AH=(x-0.6)$ km.

在 $\text{Rt}\triangle ACH$ 中, $AC^2=CH^2+AH^2$, 即 $x^2=0.8^2+(x-0.6)^2$,

解得 $x=\frac{5}{6}$, 即 $CA=\frac{5}{6}$ km,

$\therefore CA-CH=\frac{5}{6}-0.8=\frac{1}{30}$ (km).

答: 新路 CH 比原路 CA 少 $\frac{1}{30}$ km.

(3) 设 $AH=y$,

$\therefore BH=AB-AH=21-y$.

$\because CH \perp AB, AC=10, BC=17$,

根据勾股定理, 得 $CH^2=AC^2-AH^2=BC^2-BH^2$,

即 $10^2-y^2=17^2-(21-y)^2$,

解得 $y=6$,

$\therefore AH=6$.

$\because CH^2=AC^2-AH^2=10^2-6^2=64$,

$\therefore CH=8$.

23. 解: (1) $EF^2=BE^2+CF^2$. 理由如下:

$\because \angle BAC=90^\circ, AB=AC$,

$\therefore$ 将 $\triangle ABE$ 绕点 A 逆时针旋转 90° 得到 $\triangle ACG$, 连接 FG , 如答图 1 所示,

$\therefore AG=AE, CG=BE, \angle ACG=\angle B, \angle EAG=90^\circ$,

$\therefore \angle FCG=\angle ACB+\angle ACG=\angle ACB+\angle B=$

$180^\circ-\angle BAC=90^\circ$,

$\therefore GF^2=CF^2+CG^2=CF^2+BE^2$.

$\because \angle EAF=45^\circ, \angle EAG=90^\circ$,

$\therefore \angle GAF=90^\circ-45^\circ=45^\circ$,

$\therefore \angle EAF=\angle GAF$.

又 $\because AF=AF, AE=AG$,

$\therefore \triangle AEF \cong \triangle AGF$ (SAS),

$\therefore EF=GF$,

$\therefore EF^2=GF^2=CF^2+BE^2$,

即 $EF^2=BE^2+CF^2$.

(2) $\because \angle BAC=60^\circ, AB=AC$,

$\therefore \angle B=\angle ACB=60^\circ$, 将 $\triangle ABE$ 绕点 A 逆时针旋转 60° 得到 $\triangle ACG$, 连接

FG , 过点 G 作 $GH \perp BC$ 交 BC 的延长线于点 H , 如答图 2 所示,

$\therefore AG=AE, CG=BE, \angle ACG=\angle B=60^\circ, \angle EAG=60^\circ$.

$\because \angle EAF=30^\circ$,

$\therefore \angle GAF=60^\circ-30^\circ=30^\circ$,

$\therefore \angle EAF=\angle GAF$.

又 $\because AF=AF, AE=AG$,

$\therefore \triangle AEF \cong \triangle AGF$ (SAS),

$\therefore EF=GF$.

在 $\text{Rt}\triangle CGH$ 中, $\because CG=BE=3, \angle GCH=180^\circ-\angle ACB-\angle ACG=60^\circ$,

$\therefore \angle CGH=30^\circ$,

$\therefore CH=\frac{1}{2}CG=\frac{3}{2}, GH^2=CG^2-CH^2=\frac{3}{4}CG^2=\frac{27}{4}$,

$\therefore FH=FC+CH=\frac{13}{2}$.

在 $\text{Rt}\triangle FGH$ 中, $GF^2=FH^2+GH^2=\left(\frac{13}{2}\right)^2+\frac{27}{4}=49$,

$\therefore EF=GF=7$.

(3) $EF^2=CE^2+BF^2$. 理由如下:

$\because AB=AC, \angle BAC=90^\circ$,

$\therefore \angle ABC=\angle ACB=45^\circ$.

将 $\triangle AEC$ 绕点 A 顺时针旋转 90° 得到 $\triangle AGB$, 连接 FG , 如答图 3 所示,

$\therefore \angle CAE=\angle BAG, CE=BG, AE=AG$,

$\angle ACE=\angle ABG=45^\circ, \angle EAG=\angle CAB=90^\circ$,

$\therefore \angle GBF=\angle ABC+\angle ABG=90^\circ, \angle FAG=$

$360^\circ-\angle EAF-\angle EAG=360^\circ-135^\circ-$

$90^\circ=135^\circ$,

$\therefore \angle FAE=\angle FAG$.

$\because FA=FA, AE=AG$,

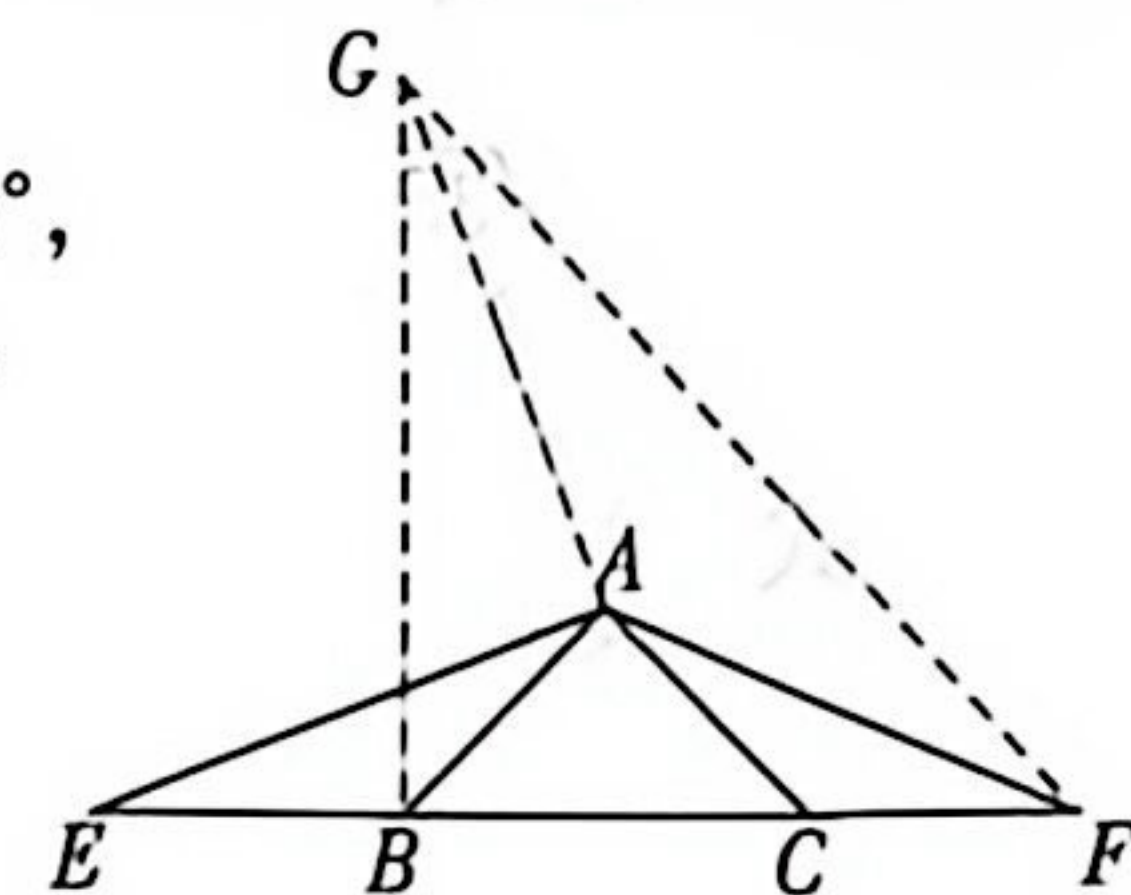
$\therefore \triangle FAE \cong \triangle FAG$ (SAS),

$\therefore EF=GF$.

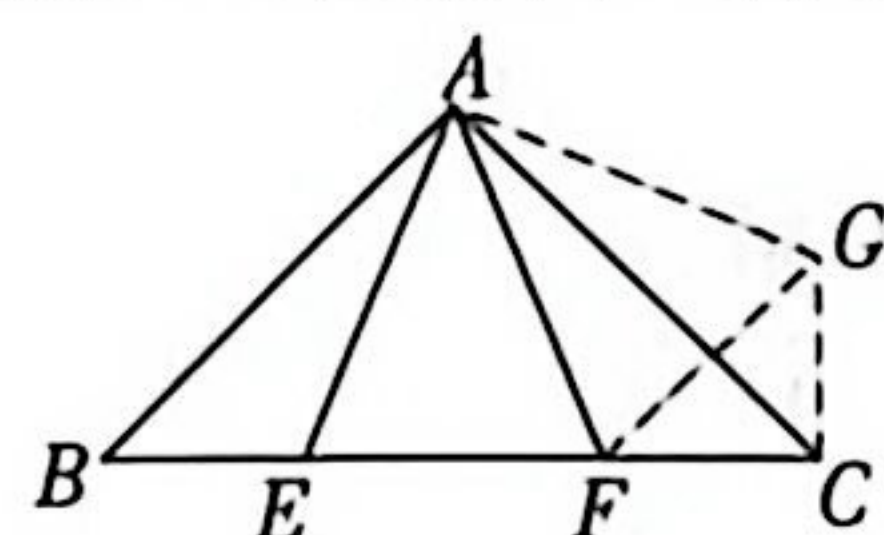
在 $\text{Rt}\triangle FBG$ 中, $\because \angle FBG=90^\circ$,

$\therefore GF^2=BG^2+BF^2$,

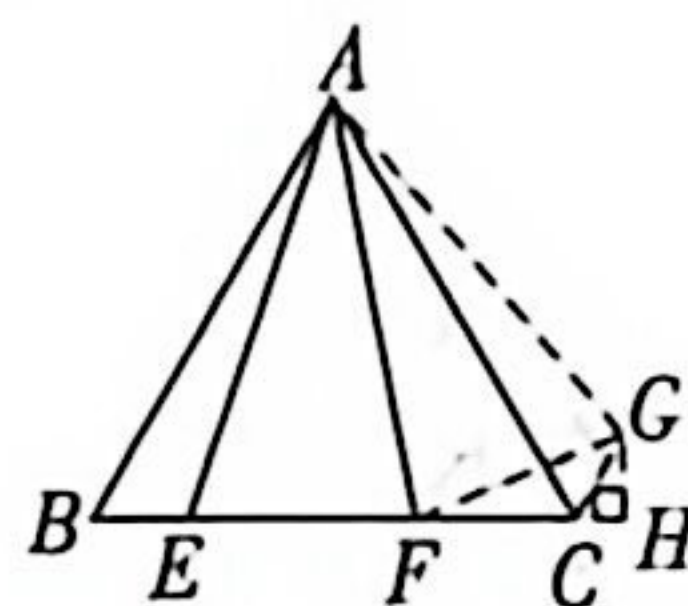
$\therefore EF^2=CE^2+BF^2$.



第 23 题答图 3



第 23 题答图 1



第 23 题答图 2