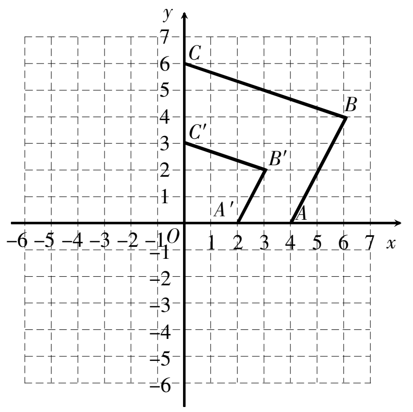
5.解:如图,四边形 $OA'B'C'$ 即为所求作的四边形.



(第 5 题图)

四边形 $OA'B'C'$ 与四边形 $OABC$ 是位似图形.理由如下:

根据题意,得 $OA=4,OC=6$.

由勾股定理,得 $AB=\sqrt{2^2+4^2}=\sqrt{20}=2\sqrt{5}$,$BC=\sqrt{2^2+6^2}=\sqrt{40}=2\sqrt{10}$.

又 $OA'=2,OC'=3,A'B'=\sqrt{1^2+2^2}=\sqrt{5}$,$B'C'=\sqrt{1^2+3^2}=\sqrt{10}$,

$\therefore \frac{OA'}{OA}=\frac{A'B'}{AB}=\frac{B'C'}{BC}=\frac{OC'}{OC}=\frac{1}{2}$.

$\therefore$ 四边形 $OA'B'C'$ 与四边形 $OABC$ 是以点 O 为位似中心的位似图形,相似比为 $\frac{1}{2}$.

第 20 期

2 版

28.1 锐角三角函数

第 1 课时

1.D　2. $\frac{4}{5}$　3. $\frac{\sqrt{2}}{2}$　4. $\frac{3}{5}$

第 2 课时

1.C　2.D　3. $\frac{2}{3}$　4.B　5.B

6.解:$\because \angle C=90°,AC=4,BC=2$,

$\therefore AB=\sqrt{BC^2+AC^2}=\sqrt{2^2+4^2}=2\sqrt{5}$.

$\therefore \sin A=\frac{BC}{AB}=\frac{2}{2\sqrt{5}}=\frac{\sqrt{5}}{5}$,$\cos A=\frac{AC}{AB}=\frac{4}{2\sqrt{5}}=\frac{2\sqrt{5}}{5}$,$\tan A=\frac{BC}{AC}=\frac{2}{4}=\frac{1}{2}$.

第 3 课时

1.D　2.D

3.解:(1)原式 $=3\times\frac{\sqrt{3}}{3}-1^2+2\times\frac{\sqrt{3}}{2}=\sqrt{3}-1+\sqrt{3}=2\sqrt{3}-1$.

(2)原式 $=2\times\left(\frac{\sqrt{2}}{2}\right)^2-1+\frac{\sqrt{3}}{3}\times\sqrt{3}=1-1+1=1$.

第 4 课时

1.解:(1)$\sin 35°\approx 0.574$;

(2)$\cos 62°18'=\cos 62.3°\approx 0.465$;

(3)$\tan 15°24'36''=\tan 15°24.6'=\tan 15.41°\approx 0.276$.

2.(1)$72°24'$;(2)$30°36'$;

(3)$10°42'$.

3~4 版

一、选择题

1~5.BCCCB　6~10.BDDCA

二、填空题

11. $\frac{1}{3}$　12.2.14　13.45°

14. $\frac{\sqrt{2}}{2}$　15. $3\sqrt{3}$ 或 $\frac{\sqrt{3}}{3}$

三、解答题(一)

16.解:(1)原式 $=\frac{\sqrt{2}}{2}+2\times\frac{\sqrt{3}}{2}-\sqrt{3}=\frac{\sqrt{2}}{2}+\sqrt{3}-\sqrt{3}=\frac{\sqrt{2}}{2}$.

(2)原式 $=\frac{1}{2}-2\times\left(\frac{\sqrt{2}}{2}\right)^2+3\times\left(\frac{\sqrt{3}}{3}\right)^2-\frac{1}{2}=\frac{1}{2}-2\times\frac{1}{2}+3\times\frac{1}{3}-\frac{1}{2}=\frac{1}{2}-1+1-\frac{1}{2}=0$.

17.解:在 $Rt\triangle ABC$ 中,$\angle C=90°$,$AC=2,BC=3$,

$\therefore AB=\sqrt{AC^2+BC^2}=\sqrt{2^2+3^2}=\sqrt{13}$.

$\therefore \tan A=\frac{BC}{AC}=\frac{3}{2}$,$\cos A=\frac{AC}{AB}=\frac{2}{\sqrt{13}}=\frac{2\sqrt{13}}{\sqrt{13}}$.

18.解:过点 A 作 $AH\perp BC$ 于点 H.

$\because S_{\triangle ABC}=27$,

$\therefore \frac{1}{2}\times 9\times AH=27$.

解得 $AH=6$.

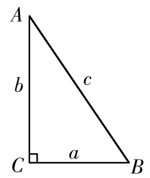
$\because AB=10$,

$\therefore BH=\sqrt{AB^2-AH^2}=\sqrt{10^2-6^2}=8$.

$\therefore \tan B=\frac{AH}{BH}=\frac{6}{8}=\frac{3}{4}$.

四、解答题(二)

19.解:如图,在 $Rt\triangle ABC$ 中,$\sin A=\frac{a}{c}$,$\cos A=\frac{b}{c}$,根据勾股定理,得 $a^2+b^2=c^2$.



(第 19 题图)

(1)证明:$\sin^2A+\cos^2A=\left(\frac{a}{c}\right)^2+\left(\frac{b}{c}\right)^2=\frac{a^2+b^2}{c^2}=1$.

(2)$\because \sin A\cdot\cos A=\frac{1}{2}$,

$\therefore \frac{a}{c}\cdot\frac{b}{c}=\frac{1}{2}$.

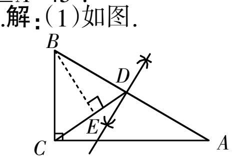
$\therefore c^2=2ab$.

$\therefore a^2+b^2=2ab$,即 $(a-b)^2=0$.

$\therefore a=b$.

$\therefore \angle A=45°$.

20.解:(1)如图.



(第 20 题图)

(2)如图,过点 B 作 $BE\perp CD$ 于点 E.

由(1)知 $CD=AD=BD=\frac{1}{2}AB=5$.

设 $DE=x$,则 $CE=CD-DE=5-x$.

在 $Rt\triangle BDE$ 中,$BE^2=BD^2-DE^2=5^2-x^2$,

在 $Rt\triangle BCE$ 中,$BE^2=BC^2-CE^2=6^2-(5-x)^2$.

$\therefore 5^2-x^2=6^2-(5-x)^2$.

解得 $x=1.4$.

$\therefore DE=1.4$.

$\therefore \cos\angle CDB=\frac{DE}{BD}=\frac{1.4}{5}=\frac{7}{25}$.

21.解:(1)2,$\frac{1}{2}$.

(2)$\frac{3}{2}$.

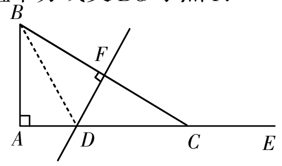
(3)$\because \tan A=\frac{a}{b}$,$\cot B=\frac{a}{b}$,

$\therefore \tan A=\cot B$.

$\therefore \cot 40°\cdot\cot 50°=\tan 50°\cdot\cot 50°=1$.

五、解答题(三)

22.解:(1)如图,连接 BD,设 BC 的垂直平分线交 BC 于点 F.



(第 22 题图)

$\therefore BD=CD$.

$\therefore \triangle ABD$ 的周长 $=AB+AD+BD$
$=AB+AD+DC$
$=AB+AC$.

$\because AB=CE$,

$\therefore \triangle ABD$ 的周长 $=AC+CE=AE=1$.

故 $\triangle ABD$ 的周长为 1.

(2)设 $AD=x$.

$\because AD=\frac{1}{3}BD$,$\therefore BD=3x$.

又 $\because BD=CD$,$\therefore AC=AD+CD=4x$.

在 $Rt\triangle ABD$ 中,$AB=\sqrt{BD^2-AD^2}=\sqrt{(3x)^2-x^2}=2\sqrt{2}x$.

$\therefore \tan\angle ABC=\frac{AC}{AB}=\frac{4x}{2\sqrt{2}x}=\sqrt{2}$.

23.解:(1)$\frac{1}{2}$,$\frac{\sqrt{3}}{2}$.

(2)$\because$ 在 $Rt\triangle ABC$ 中,$\angle C=90°$,$AB=1$,$\angle A=\alpha$,

$\therefore \sin\alpha=\frac{BC}{AB}=BC$,$\cos\alpha=\frac{AC}{AB}=AC$.

取 AB 的中点 O,连接 OC,过点 C 作 $CD\perp AB$ 于点 D.

$\therefore OA=OB=OC=\frac{1}{2}AB=\frac{1}{2}$.

$\therefore \angle BOC=2\alpha$.

$\therefore$ 在 $Rt\triangle CDO$ 中,$\tan 2\alpha=\frac{CD}{OD}$.

$\because \frac{CD}{AC}=\sin\alpha$,$AC=\cos\alpha$,

$\therefore CD=AC\cdot\sin\alpha=\cos\alpha\cdot\sin\alpha$.

$\because \angle B+\angle A=90°$,$\angle B+\angle BCD=90°$,

$\therefore \angle BCD=\angle A=\alpha$.

$\therefore$ 在 $Rt\triangle BCD$ 中,$\sin\angle BCD=\sin\alpha=\frac{BD}{BC}$.

$\therefore BD=BC\cdot\sin\alpha$,$OD=OB-BD=\frac{1}{2}-BC\cdot\sin\alpha=\frac{1}{2}-\sin^2\alpha$.

$\therefore \tan 2\alpha=\frac{\sin\alpha\cdot\cos\alpha}{\frac{1}{2}-\sin^2\alpha}=\frac{2\sin\alpha\cdot\cos\alpha}{1-2\sin^2\alpha}$.

第 17 期

2 版

27.1 图形的相似

第 1 课时

1.A　2.D

第 2 课时

1.D　2.6

3.解:不相似.理由如下:

$\because$ 矩形 $ABCD$ 中,$AB=2m,AD=3m$,金边宽度为 $10cm=0.1m$,

$\therefore EF=2+2\times0.1=2.2\ (m)$,$EH=3+2\times0.1=3.2(m)$.

$\therefore \frac{AB}{EF}=\frac{2}{2.2}=\frac{10}{11}$,$\frac{AD}{EH}=\frac{3}{3.2}=\frac{15}{16}$.

$\therefore \frac{AB}{EF}\neq\frac{AD}{EH}$.

$\therefore$ 矩形 $ABCD$ 与矩形 $EFGH$ 不相似.

27.2.1 相似三角形的判定

第 1 课时

1.A　2.D　3.10

第 2 课时

1.解:$\triangle ABC\backsim\triangle DEF$.

理由:$\because AC=3,BC=3.5,AB=4,DF=1.8,EF=2.1,DE=2.4$,

$\therefore \frac{AC}{DF}=\frac{BC}{EF}=\frac{AB}{DE}=\frac{5}{3}$.

$\therefore \triangle ABC\backsim\triangle DEF$.

2.B

3.解:(1)$\because \angle B=30°,AB=3cm,AC=4cm,\angle B'=30°,A'B'=6cm,A'C'=8cm$,

$\therefore \frac{AB}{A'B'}=\frac{AC}{A'C'}=\frac{1}{2}$.

虽然两边对应成比例,$\angle B=\angle B'$,但 $\angle B$ 与 $\angle B'$ 不是已知两边的夹角,

故 $\triangle ABC$ 与 $\triangle A'B'C'$ 不一定相似.

(2)$\because AB=4cm,BC=6cm,AC=5cm,A'B'=12cm,B'C'=18cm,A'C'=15cm$,

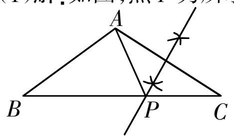
$\therefore \frac{AB}{A'B'}=\frac{AC}{A'C'}=\frac{BC}{B'C'}=\frac{1}{3}$.

$\therefore \triangle ABC\backsim\triangle A'B'C'$.

第 3 课时

1.答案不唯一,如 $\angle ACD=\angle B$

2.(1)解:如图,点 P 为所求作的点.



(第 2 题图)

(2)证明:$\because AB=AC$,$\therefore \angle B=\angle C$.

$\because PA=PC$,$\therefore \angle C=\angle PAC$.

$\therefore \angle PAC=\angle B$.

又 $\angle C=\angle C$,$\therefore \triangle ABC\backsim\triangle PAC$.

3~4 版

一、选择题

1~5.BCDCA　6~10.DCCBD

二、填空题

11.6　12. $\triangle MCB$

13. $\sqrt{2}:1$　14.8　15.1 或 2

三、解答题(一)

16.(1)解:$\because$ 两个四边形相似,

$\therefore \frac{18}{10}=\frac{x}{12}$.

解得 $x=21.6$.

$\alpha=360°-88°-96°-107°=69°$.

(2)证明:$\because AD=2,BD=6$,$\therefore AB=8$.

$\therefore \frac{AD}{AC}=\frac{2}{4}=\frac{1}{2}$,$\frac{AC}{AB}=\frac{4}{8}=\frac{1}{2}$.

$\therefore \frac{AD}{AC}=\frac{AC}{AB}$.

又 $\angle A=\angle A$,$\therefore \triangle ACD\backsim\triangle ABC$.

17.解:不相似.理由如下:

内边缘的矩形 $ABCD$ 的长 $AD=300cm$,宽 $AB=150cm$,外边缘的矩形 $A'B'C'D'$ 长 $A'D'=315cm$,宽 $A'B'=165cm$.

$\because \frac{AD}{A'D'}=\frac{300}{315}$,$\frac{AB}{A'B'}=\frac{150}{165}$,且 $\frac{AD}{A'D'}\neq\frac{AB}{A'B'}$,

$\therefore$ 内外边缘所成的两个矩形不相似.

18.解:(1)$\triangle ABC\backsim\triangle BDE$.理由如下:

根据勾股定理,得 $AC=\sqrt{10}$,$BC=\sqrt{5}$,$BD=2\sqrt{5}$,$BE=2\sqrt{2}$.

$\because AB=5,DE=2$,

$\therefore \frac{AB}{BD}=\frac{5}{2\sqrt{5}}=\frac{\sqrt{5}}{2}$,$\frac{AC}{BE}=\frac{\sqrt{10}}{2\sqrt{2}}=\frac{\sqrt{5}}{2}$,$\frac{BC}{DE}=\frac{\sqrt{5}}{2}$.

$\therefore \frac{AB}{BD}=\frac{AC}{BE}=\frac{BC}{DE}$.

$\therefore \triangle ABC\backsim\triangle BDE$.

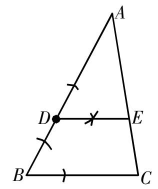
(2)由(1)知,$\triangle ABC\backsim\triangle BDE$.

$\therefore \angle BAC=\angle DBE$.

$\therefore \angle ACD=\angle BAC+\angle ABC=\angle DBE+\angle ABC=\angle ABE=45°$.

四、解答题(二)

19.解:(1)如图.



(第 19 题图)

(2)$\because DE\parallel BC$,$\therefore \frac{AD}{DB}=\frac{AE}{EC}$.

$\because AD=2BD$,$\therefore \frac{AE}{EC}=2$.

$\because AC=10$,$\therefore \frac{AE}{10-AE}=2$.

解得 $AE=\frac{20}{3}$(cm).

20.证明:(1)$\because BA=BC,DA=DE$,

$\therefore \frac{BA}{DA}=\frac{BC}{DE}$.

$\because \angle ADC=\angle ABC+\angle BAD=\angle ADE+\angle EDC$,$\angle EDC=\angle BAD$,

$\therefore \angle ABC=\angle ADE$.

$\therefore \triangle ABC\backsim\triangle ADE$.

(2)$\because \triangle ABC\backsim\triangle ADE$,

$\therefore \angle BAC=\angle DAE$

$\therefore \angle BAD=\angle CAE=\angle CDE$.

$\because \angle COD=\angle EOA$,$\therefore \triangle COD\backsim\triangle EOA$.

$\therefore \frac{OC}{OE}=\frac{OD}{OA}$,即 $OD\cdot OE=OA\cdot OC$.

21.证明:(1)$\because AD\parallel BC$,$\therefore \angle ACF=\angle DAC$.

$\because \angle FAC=\angle ADE,AC=AD$,

$\therefore \triangle ACF\cong\triangle DAE$(ASA).

$\therefore AF=DE$.

(2)$\because \triangle ACF\cong\triangle DAE$,$\therefore \angle AFC=\angle DEA$.

$\therefore \angle AFB=\angle DEC$.

$\because \angle ABC=\angle CDE$,$\therefore \triangle ABF\backsim\triangle CDE$.

$\therefore \frac{AF}{CE}=\frac{BF}{DE}$.

$\therefore AF\cdot DE=BF\cdot CE$.

$\because AF=DE$,$\therefore AF^2=BF\cdot CE$.

五、解答题(三)

22.(1)证明:$\because \triangle ACD,\triangle BCE$ 分别是以 AC,BC 为底边的等腰三角形,

$\therefore \angle A=\angle DCA,\angle ECB=\angle CBE,CE=BE$.

$\because \angle A=\angle CBE$,

$\therefore \angle A=\angle ECB,\angle ADC=\angle CEB$.

$\therefore AD\parallel CE$.$\therefore \angle ADC=\angle DCE$.

$\therefore \angle DCE=\angle CEB$.

又 $EF=AD=CD,CE=BE$,

$\therefore \triangle DCE\cong\triangle FEB$(SAS).

$\therefore DE=BF$.

(2)解:由(1)知,$\angle A=\angle DCA=\angle ECB=\angle EBC$.

$\therefore DC\parallel BE$.

过点 G 作 $GH\parallel CD$,交 CE 于点 H,则 $GH\parallel BE$.

$\because DG=EG,GH\parallel CD$,$\therefore CH=EH$.

$\because AD=2,AD=CD$,$\therefore CD=2$.

$\therefore GH=\frac{1}{2}CD=1$.

设 $CE=BE=m$.则 $EH=\frac{1}{2}m$.

$\because EF=AD=2$,$\therefore FH=\frac{1}{2}m-2$.

$\because GH\parallel BE$,$\therefore \triangle GHF\backsim\triangle BEF$.

$\therefore \frac{GH}{BE}=\frac{FH}{EF}$,即 $\frac{1}{m}=\frac{\frac{1}{2}m-2}{2}$.

解得 $m=2+2\sqrt{2}$ 或 $m=2-2\sqrt{2}$(舍去).

$\therefore BE$ 的长为 $2+2\sqrt{2}$.

23.(1)证明:连接 OA,AD.

$\because CD$ 为直径,

$\therefore \angle CAD=90°$.

$\because \angle ADC=\angle B=60°$,$\therefore \angle ACD=30°$.

$\because AP=AC$,$\therefore \angle P=\angle ACD=30°$.

$\because \angle AOD=2\angle ACD=60°$,

$\therefore \angle OAP=180°-60°-30°=90°$.

$\therefore OA\perp PA$.

$\therefore PA$ 是 $\odot O$ 的切线.

(2)证明:$\because OA=OC$,

$\therefore \angle CAO=\angle ACP=30°$.

$\therefore \angle P=\angle CAO$.

又 $\angle ACO=\angle PCA$,

$\therefore \triangle ACO\backsim\triangle PCA$.

$\therefore \frac{AC}{CP}=\frac{CO}{AC}$.

$\therefore AC^2=CO\cdot CP$.

(3)解:$\because AO=DO,\angle AOD=60°$,

$\therefore \triangle AOD$ 是等边三角形.

$\therefore \angle OAD=60°$.

$\therefore \angle PAD=30°$.

$\therefore \angle P=\angle PAD$.

$\therefore AD=PD=\sqrt{3}$.

$\therefore OD=\sqrt{3}$.

$\therefore \odot O$ 的直径为 $2\sqrt{3}$.

⑤

第 18 期

2 版

27.2.2 相似三角形的性质

1~4.BADA　5.16　6.10

7.证明：$\because \frac{AB}{A_1B_1}=\frac{AD}{A_1D_1}=\frac{BD}{B_1D_1}$,

$\therefore$Rt$\triangle ABD\backsim$Rt$\triangle A_1B_1D_1$.

$\therefore \angle ABC=\angle A_1B_1C_1$.

又$\angle C=\angle C_1$, $\therefore \triangle ABC\backsim \triangle A_1B_1C_1$.

$\therefore \frac{BE}{B_1E_1}=\frac{AB}{A_1B_1}$. $\therefore \frac{AD}{A_1D_1}=\frac{BE}{B_1E_1}$.

8.解：$\because M,N$分别是DE,BC的中点，

$\therefore AM,AN$分别为$\triangle ADE$, $\triangle ABC$的中线.

$\because \triangle ADE\backsim \triangle ABC$, $\therefore \frac{DE}{BC}=\frac{AM}{AN}=\frac{1}{2}$.

$\therefore \frac{S_{\triangle ADE}}{S_{\triangle ABC}}=\left(\frac{DE}{BC}\right)^2=\frac{1}{4}$.

27.2.3 相似三角形应用举例

1.C　2.B　3.4.2　4.7.5

5.解：$\because AD\parallel EG$, $\therefore \angle ADO=\angle EGF$.

又$\angle AOD=\angle EFG=90^\circ$,

$\therefore \triangle AOD\backsim \triangle EFG$.

$\therefore \frac{AO}{EF}=\frac{OD}{FG}$，即$\frac{AO}{1.8}=\frac{20}{2.4}$.

解得$AO=15$.

同理，得$\triangle BOC\backsim \triangle AOD$.

$\therefore \frac{BO}{AO}=\frac{OC}{OD}$，即$\frac{BO}{15}=\frac{16}{20}$.

解得$BO=12$.

$\therefore AB=AO-BO=15-12=3$(米).

答：旗杆AB的高是 3 米.

3~4 版

一、选择题

1~5.ADDAD　6~10.BAAAC

二、填空题

11.9　12.3.2　13.$\frac{72}{5}$　14.24

15.21.2

三、解答题(一)

16.解：(1)设小三角形的面积为Scm².

$\because$ 两个相似三角形对应角平分线的比为 3:10,

$\therefore$ 两个相似三角形的相似比为 3:10.

$\therefore \frac{S}{400}=\left(\frac{3}{10}\right)^2=\frac{9}{100}$.

解得$S=36$.

答：小三角形的面积为 36cm².

(2)连接BD.

由题意，得$EF\parallel BD$.

$\therefore \triangle AEF\backsim \triangle ABD$.

$\therefore \frac{AE}{AB}=\frac{EF}{BD}$，即$\frac{28}{28+35}=\frac{20}{BD}$.

解得$BD=45$(mm).

$\therefore B,D$两点之间的距离减少了 45−20=25(mm).

17.解：$\because DE\perp AC$, $BC\perp AC$,

$\therefore DE\parallel BC$.

$\therefore \triangle ADE\backsim \triangle ABC$.

$\therefore \frac{AE}{AC}=\frac{DE}{BC}$，即$\frac{1}{1+5}=\frac{1.5}{BC}$.

解得$BC=9$(m).

答：楼高BC是 9m.

18.解：设$\triangle A'B'C'$的周长为x.

$\because \triangle ABC\backsim \triangle A'B'C'$，且相似比为$\frac{AB}{A'B'}=\frac{3}{4}$, $AB=6$, $BC=5$, $AC=4$,

$\therefore \frac{6+5+4}{x}=\frac{3}{4}$.

解得$x=20$.

因此，$\triangle A'B'C'$的周长为 20.

四、解答题(二)

19.解：(1)$\because \triangle ABC\backsim \triangle A'B'C'$, $\frac{AB}{A'B'}=\frac{1}{2}$, AB边上的中线$CD=4$cm,

$\therefore \frac{CD}{C'D'}=\frac{1}{2}$. $\therefore C'D'=4\times 2=8$(cm).

$\therefore A'B'$边上的中线$C'D'$的长为 8cm.

(2)$\because \triangle ABC\backsim \triangle A'B'C'$, $\frac{AB}{A'B'}=\frac{1}{2}$, $\triangle ABC$的周长为 20cm,

$\therefore \frac{C_{\triangle ABC}}{C_{\triangle A'B'C'}}=\frac{1}{2}$.

$\therefore C_{\triangle A'B'C'}=20\times 2=40$(cm).

$\therefore \triangle A'B'C'$的周长为 40cm.

(3)$\because \triangle ABC\backsim \triangle A'B'C'$, $\frac{AB}{A'B'}=\frac{1}{2}$, $\triangle A'B'C'$的面积是 64cm²,

$\therefore \frac{S_{\triangle ABC}}{S_{\triangle A'B'C'}}=\left(\frac{1}{2}\right)^2=\frac{1}{4}$.

$\therefore S_{\triangle ABC}=64\div 4=16$(cm²).

$\therefore \triangle ABC$的面积是 16cm².

20.(1)证明：$\because \angle 1=\angle E$,

$\therefore AD\parallel BE$.

$\therefore \angle D=\angle DCE$.

$\because \angle B=\angle D$, $\therefore \angle B=\angle DCE$.

$\therefore AB\parallel CD$.

$\therefore \angle BAF+\angle AFC=180^\circ$.

(2)解：①$\because BC=2CE$, $\therefore BE=3CE$.

由(1)知$AB\parallel CD$, $\therefore \triangle FCE\backsim \triangle ABE$.

$\therefore \frac{S_{\triangle FCE}}{S_{\triangle ABE}}=\left(\frac{EC}{BE}\right)^2=\left(\frac{1}{3}\right)^2=\frac{1}{9}$，即$\frac{S_{\triangle ABE}}{S_{\triangle FCE}}=9$.

②$\because \frac{S_{\triangle ABE}}{S_{\triangle FCE}}=9$,

$\therefore \frac{S_{\triangle ABE}-S_{\triangle FCE}}{S_{\triangle FCE}}=8$，即$\frac{S_{四边形CFAB}}{S_{\triangle FCE}}=8$.

$\therefore \frac{S_{\triangle FCE}}{S_{四边形CFAB}}=\frac{1}{8}$.

21.解：$\because AD\parallel CE$, $\therefore \angle CED=\angle ADB$.

又$\angle CDE=\angle ABD=90^\circ$,

$\therefore \triangle CDE\backsim \triangle ABD$.

$\therefore \frac{CD}{AB}=\frac{DE}{BD}$.

$\because$ 高 2 米的标杆CD的影子DE为 2 米，即$CD=DE$, $\therefore BD=AB$.

如图，过点M作$MF\perp AB$于点F，交GH于点J,

则四边形$BHJF$, $MNHJ$是矩形.

$\therefore BF=MN=HJ=1.5$, $MJ=NH=0.8$.

$\therefore GJ=GH-HJ=2.5-1.5=1$.

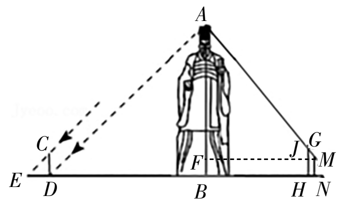
$\therefore FM=BN=DN-BD=24-AB$, $AF=AB-1.5$.

$\because GJ\parallel AF$, $\therefore \triangle MGJ\backsim \triangle MAF$.

$\therefore \frac{GJ}{AF}=\frac{MJ}{MF}$，即$\frac{1}{AB-1.5}=\frac{0.8}{24-AB}$.

解得$AB=14$(米).

答：秦始皇雕塑AB的高度为 14米.



(第 21 题图)

五、解答题(三)

22.解：(1)$\because$ 四边形$EGHF$为正方形，

$\therefore EF\parallel GH$, $EF=EG$, $\angle FEG=\angle EGH=90^\circ$.

$\therefore \triangle AEF\backsim \triangle ABC$.

$\because AD\perp BC$, $\therefore AD\perp EF$.

$\therefore \frac{EF}{BC}=\frac{AK}{AD}$.

$\because \angle FEG=\angle EGD=\angle GDK=90^\circ$,

$\therefore$ 四边形$EGDK$为矩形.

$\therefore KD=EG=EF$. $\therefore \frac{EF}{120}=\frac{80-EF}{80}$.

解得$EF=48$(mm).

答：这个正方形零件的边长为48mm.

(2)$\because$ 四边形$EGHF$为矩形，

$\therefore EF\parallel GH$，即$EF\parallel BC$.

$\therefore \triangle AEF\backsim \triangle ABC$.

$\because AD\perp BC$, $\therefore AD\perp EF$.

$\therefore \frac{EF}{BC}=\frac{AK}{AD}$.

设$EG=x$, $EF=y$,

$\therefore \frac{y}{120}=\frac{80-x}{80}$.

$\therefore y=-\frac{3}{2}x+120$.

$\therefore S_{矩形EGHF}=xy=x\left(-\frac{3}{2}x+120\right)=-\frac{3}{2}x^2+120x=-\frac{3}{2}(x-40)^2+2400$.

$\because -\frac{3}{2}<0$, $\therefore$ 当$x=40$时，S最大，最大值为 2400.

答：矩形$EGHF$的面积S的最大值是 2400mm².

23.解：(1)2α.

(2)如图，过点D作$DC\perp PM$于点C.

根据题意，得$AB=250$cm, $AD=100$cm.

则$AE=50$cm.

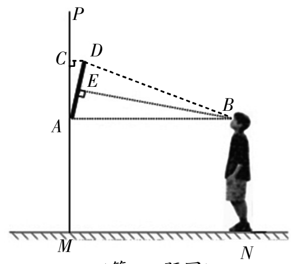
$\because \angle CAD=\angle ABE=\alpha$, $\angle ACD=\angle AEB=90^\circ$,

$\therefore \triangle ACD\backsim \triangle BEA$.

$\therefore \frac{CD}{AE}=\frac{AD}{AB}$，即$\frac{CD}{50}=\frac{100}{250}$.

解得$CD=20$(cm).

$\therefore$ 油画顶部点D到墙壁PM的距离是 20cm.



(第 23 题图)

(3)当油画底部A处位置不变，油画AD与墙壁的夹角逐渐减小时，小然为了保证欣赏油画的视觉效果最佳，他应该远离墙壁PM.

第 19 期

2~3 版

一、选择题

1~5.CDBDB　6~10.DACAC

二、填空题

11.16　12.15　13.1

14.$4\sqrt{2}\pi$　15.$\frac{25}{8}$或$\frac{7}{8}$

三、解答题(一)

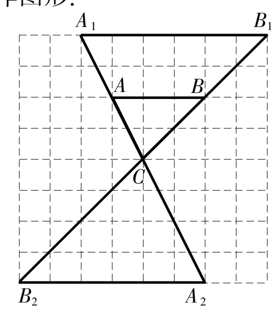
16.解：(1)$\because l_1\parallel l_2\parallel l_3$, $\therefore \frac{AB}{BC}=\frac{DE}{EF}$.

$\because \frac{AB}{BC}=\frac{2}{3}$, $\therefore \frac{DE}{EF}=\frac{2}{3}$.

$\because EF=6$, $\therefore DE=4$.

$\therefore DF=DE+EF=4+6=10$.

(2)如图，$\triangle A_1B_1C$和$\triangle A_2B_2C$为所求作图形.



(第 16(2)题图)

17.解：$\triangle ABC$和$\triangle DEF$相似.

理由如下：$\because$ 小正方形的边长为 1,

$\therefore AB=\sqrt{4^2+3^2}=5$, $AC=\sqrt{4^2+2^2}=2\sqrt{5}$, $BC=\sqrt{1^2+2^2}=\sqrt{5}$；

$DE=\sqrt{2^2+2^2}=2\sqrt{2}$, $EF=\sqrt{4^2+4^2}=4\sqrt{2}$, $DF=\sqrt{2^2+6^2}=2\sqrt{10}$.

$\because \frac{BC}{DE}=\frac{AC}{EF}=\frac{AB}{DF}=\frac{\sqrt{10}}{4}$,

$\therefore \triangle ABC\backsim \triangle FDE$.

18.(1)证明：$\because AB\parallel CD$,

$\therefore \angle ABD=\angle CDE$.

又$\angle 1=\angle 2$, $\therefore \triangle ABD\backsim \triangle EDC$.

(2)解：$\because \triangle ABD\backsim \triangle EDC$,

$\therefore \angle DEC=\angle A=130^\circ$.

$\therefore \angle BEC=50^\circ$.

$\because BE=BC$, $\therefore \angle BCE=\angle BEC=50^\circ$.

$\therefore \angle DBC=180^\circ-2\times 50^\circ=80^\circ$.

四、解答题(二)

19.解：(1)4,3.

(2)设点E的坐标为$(m,0)$，则$OE=|m|$.

$\because \triangle AOE\backsim \triangle DAO$,

$\therefore \frac{OA}{AD}=\frac{OE}{OA}$，即$\frac{4}{6}=\frac{|m|}{4}$.

解得$|m|=\frac{8}{3}$. $\therefore m=\pm\frac{8}{3}$.

$\therefore$ 点E的坐标为$\left(\frac{8}{3},0\right)$或$\left(-\frac{8}{3},0\right)$.

20.解：(1)由题意，可得$FC\parallel DE$.

则$\triangle BFC\backsim \triangle BED$.

$\therefore \frac{BC}{BD}=\frac{FC}{DE}$，即$\frac{BC}{BC+4}=\frac{1.5}{3.5}$.

解得$BC=3$(m).

$\therefore BC$的长为 3m.

(2)$\because AC=5.4$, $BC=3$, $\therefore AB=5.4-3=2.4$.

$\because$ 光在镜面反射中的入射角等于反射角，$\therefore \angle FBC=\angle GBA$.

又$\angle FCB=\angle GAB=90^\circ$,

$\therefore \triangle BGA\backsim \triangle BFC$.

$\therefore \frac{AG}{FC}=\frac{AB}{BC}$，即$\frac{AG}{1.5}=\frac{2.4}{3}$.

解得$AG=1.2$(m).

答：灯泡到地面的高度AG为 1.2m.

21.(1)证明：$\because$ 四边形$ABCD$是矩形，

$\therefore \angle ADC=\angle A=90^\circ$.

$\therefore \angle ADE+\angle GDC=90^\circ$.

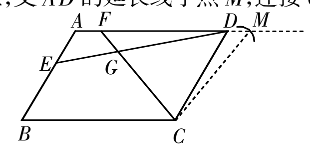
$\because DE\perp CF$, $\therefore \angle DCF+\angle GDC=90^\circ$.

$\therefore \angle ADE=\angle DCF$. $\therefore \triangle ADE\backsim \triangle DCF$.

$\therefore \frac{DE}{CF}=\frac{AD}{DC}$.

(2)解：第(1)问的结论仍成立.证明如下：

如图，以点C为圆心，CF的长为半径画弧，交AD的延长线于点M，连接CM.



(第 21 题图)

$\therefore CM=CF$.

$\therefore \angle CMD=\angle CFD$.

$\because$ 四边形$ABCD$是平行四边形，

$\therefore AD\parallel BC$, $AB\parallel CD$.

$\therefore \angle B+\angle A=180^\circ$.

$\because \angle B=\angle EGF$, $\therefore \angle A+\angle EGF=180^\circ$.

$\therefore \angle AEG+\angle AFG=180^\circ$.

$\because \angle DFG+\angle AFG=180^\circ$,

$\therefore \angle AEG=\angle DFG$.

$\therefore \angle AED=\angle CMD$.

$\because AB\parallel CD$, $\therefore \angle A=\angle CDM$.

$\therefore \triangle ADE\backsim \triangle DCM$. $\therefore \frac{DE}{CM}=\frac{AD}{DC}$.

$\therefore \frac{DE}{CF}=\frac{AD}{DC}$.

五、解答题(三)

22.解：(1)同弧所对的圆周角相等，两角分别相等的两个三角形相似.

(2)连接OE.

$\because PA=\sqrt{5}$, $AB=3\sqrt{5}$,

$\therefore PB=\sqrt{5}+3\sqrt{5}=4\sqrt{5}$.

$\because \odot O$的半径为 4,

$\therefore CD=8$.

根据割线定理，得$PA\cdot PB=PC\cdot PD$,

即$\sqrt{5}\times 4\sqrt{5}=PC(PC+8)$.

解得$PC=2$或$PC=-10$(不合题意，舍去).

$\because PE$为$\odot O$的切线，$\therefore OE\perp PE$.

在 Rt$\triangle POE$中，$\because PO=PC+CO=2+4=6$, $OE=4$,

$\therefore PE=\sqrt{PO^2-OE^2}=\sqrt{6^2-4^2}=2\sqrt{5}$.

23.解：(1)$AD\perp BE$(或垂直).

(2)(1)中的结论成立.证明如下：

延长BE交AD于点N.

$\because \angle ACB=\angle DCE=90^\circ$,

$\therefore \angle ACD=\angle BCE$.

又$\because \frac{DC}{CE}=\frac{AC}{BC}=\frac{1}{m}$,

$\therefore \triangle DCA\backsim \triangle ECB$.

$\therefore \angle DAC=\angle CBE$.

$\because \angle CAB+\angle ABE+\angle CBE=90^\circ$,

$\therefore \angle CAB+\angle ABE+\angle DAC=90^\circ$.

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

$\therefore AD\perp BE$.

(3)如图①，当点E在线段AD上时，连接BE.

$\because \triangle DCA\backsim \triangle ECB$,

$\therefore \frac{BE}{AD}=\frac{BC}{AC}=m=\sqrt{3}$.

$\therefore BE=\sqrt{3}AD=\sqrt{3}(4+AE)$.

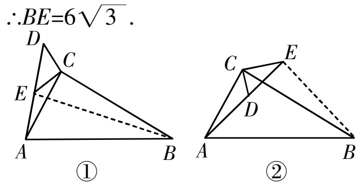
$\because AD\perp BE$,

$\therefore AB^2=AE^2+BE^2$,

即$(4\sqrt{7})^2=AE^2+3(4+AE)^2$.

$\therefore AE=2$或$AE=-8$(舍去).

$\therefore BE=6\sqrt{3}$.



(第 23 题图)

如图②，当点D在线段AE上时，连接BE.

$\because \triangle DCA\backsim \triangle ECB$,

$\therefore \frac{BE}{AD}=\frac{BC}{AC}=m=\sqrt{3}$.

$\therefore BE=\sqrt{3}AD=\sqrt{3}(AE-4)$.

$\because AD\perp BE$,

$\therefore AB^2=AE^2+BE^2$,

即$(4\sqrt{7})^2=AE^2+3(AE-4)^2$.

$\therefore AE=8$或$AE=-2$(舍去).

$\therefore BE=4\sqrt{3}$.

综上，BE的长为$6\sqrt{3}$或$4\sqrt{3}$.

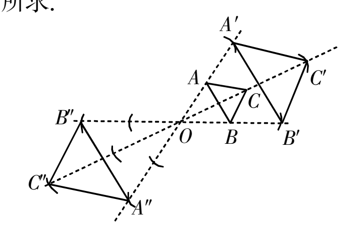
4 版

27.3 位似

第 1 课时

1.D　2.D　3.A　4.D　5.12　6.$\sqrt{5}$

7.解：如图，$\triangle A'B'C'$和$\triangle A''B''C''$即为所求.



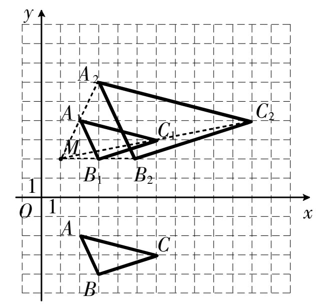
(第 7 题图)

第 2 课时

1.A　2.(4,5)　3.4.5

4.解：(1)如图，$\triangle A_1B_1C_1$为所作；

(2)如图，$\triangle A_2B_2C_2$为所作.



(第 4 题图)