Grade 7

Extra Challenges - Set III

Answers:

1. If he shot 42% over the first 50 shots, that means he made $\frac{21}{50}$ shots. If he doesn't miss a shot, then after x more shots, he will be at 50% if $\frac{21+x}{50+x}=\frac{1}{2}$.

   Solving for x:

   $$\frac{21+x}{50+x}=\frac{1}{2}$$
   $$42+2x=50+x$$
   $$x=8$$

   Thus, he must make 8 shots in a row to reach a 50% shooting percentage.

2. When folded, the box will be a rectangular prism. The formula for the volume of a rectangular prism is $\text{length}\times\text{width}\times\text{height}$. The length of the box is 5 cm, and the width is 4 cm. If the volume is 60 cm, then $5\times4\times\text{height}=60$, thus, the height of the box is 3 cm. So the original dimensions of the cardboard are $5+3+3=11$ cm and $4+3+3=10$ cm. Therefore, the area of the cardboard was $11\times10=110$ cm^2.

3. Since $a+b+c=14$ and $c+d+e=16$, by adding the equations we obtain $a+b+c+c+d+e=30$, which we can rewrite as $(a+b+c+d+e)+c=30$. Since $a+b+c+d+e=20$, then $c+20=30$. Thus, $c=10$.

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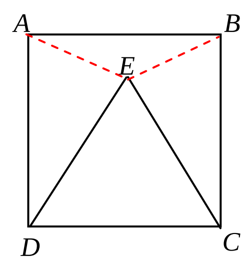
4. Since there are 12 numbers on a clock, the space between each number represents $\frac{1}{12}$ of a clock. At 10:10, one hand is at the number 10 and the other hand is at the number 2. This produces 4 numbers in between or $\frac{4}{12} = \frac{1}{3}$ of a clock. A clock has 360^{o}, so the degree measure of $\frac{1}{3}$ of a clock would be $\frac{360^{o}}{3} = 120^{o}$. However, since 10 minutes have passed, the hour hand will have moved. 10 minutes represents $\frac{1}{6}$ of an hour, so the hour hand will move $\frac{1}{6}$ the distance closer to 11. Between each number, there are $\frac{360^{o}}{12} = 30^{o}$, so the hour hand will move $\frac{30^{o}}{6} = 5^{o}$ in
10 minutes. Thus, the degree measure between the hour and minute hand at 10:10 is $120^{o} - 5^{o} = 115^{o}$.

5. $\angle AEB$ is constructed by drawing line segments *AE* and *BE*.
Since ΔEDC is equilateral and *ABCD* is a square,
ED = *EC*= *DC* = *AD* = *BC*. Thus, ΔAED and ΔBEC are isosceles. We can also conclude that since ΔEDC is equilateral, all of its interior angles are 60^{o}. Thus $\angle EDA = \angle ECB = 30^{o}$.
Because ΔADE is isosceles, $\angle DAE = \angle AED$. Thus,



$$\angle AED + \angle DAE + ADE = 180^{\circ}$$
$$2\angle AED + 30^{\circ} = 180^{\circ}$$

Thus $\angle AED = \angle DAE = 75^{o}$. Similarly, $\angle CEB = \angle CBE = 75^{o}$. We know $\angle AED + \angle DEC + \angle CEB + \angle AEB = 360^{o}$, so solving for $\angle AEB$:

$$75^{\circ} + 60^{\circ} + 75^{\circ} + \angle AEB = 360^{\circ}$$
$$\angle AEB = 150^{\circ}$$

The measure of $\angle AEB$ is 150°.