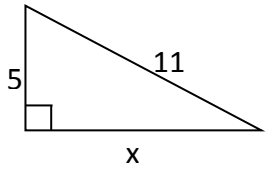
Math1312
Test 3 Review

Test 3 covers chapters 5 and 6 from the textbook.
How to study: Study the class notes, review homework problems, and try to do as many exercises as you can from the textbook. Note that answers are provided at the back of the book to all odd numbered problems.
You need to know what definitions mean and theorems and postulates as facts but you do not need to memorize them word by word.
Here I provide some examples for you. This is not a complete list, studying only these examples is not enough!

1. Find the value of x. Write your answer in the simplest radical form.



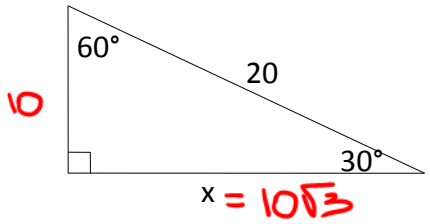
$x^2 + 5^2 = 11^2$

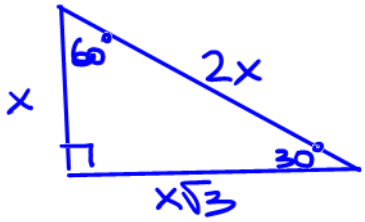
$x^2 + 25 = 121$

$x = \sqrt{121 - 25} = \sqrt{96} = \sqrt{16 \cdot 6}$

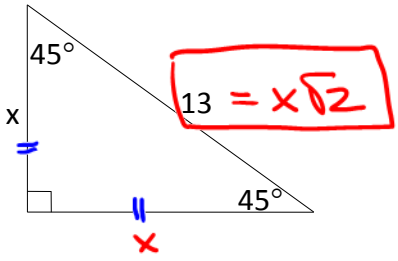
$= \sqrt{16} \cdot \sqrt{6} = \boxed{4\sqrt{6}}$

2. Find the value of x. Write your answer in the simplest radical form.



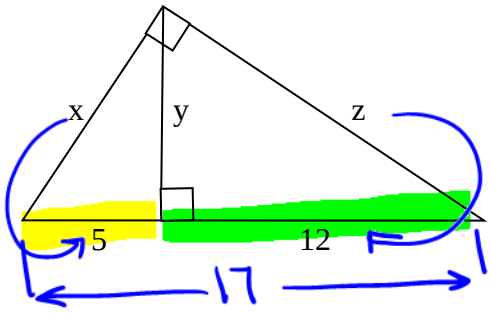


3. Find the value of x. Write your answer in the simplest radical form.



$x = \frac{13 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}} = \frac{13\sqrt{2}}{2} = 6.5\sqrt{2}$

4. Using the following figure, find x,y, and z.



$y = \sqrt{5 \cdot 12} = \sqrt{60} = \sqrt{4 \cdot 15}$

$= \sqrt{4} \cdot \sqrt{15} = 2\sqrt{15}$

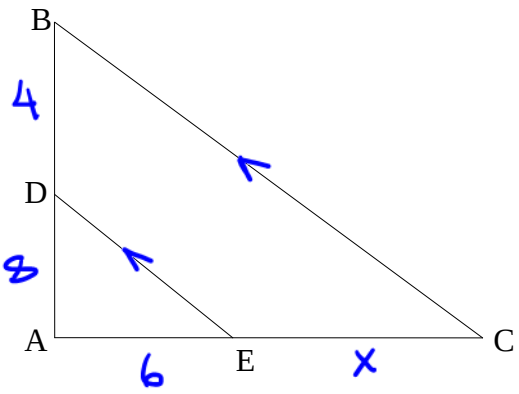
$x = \sqrt{17 \cdot 5} = \sqrt{85}$

$z = \sqrt{17 \cdot 12}$

$= \sqrt{17 \cdot 4 \cdot 3} = \sqrt{4}\sqrt{17 \cdot 3}$

$= 2\sqrt{51}$

5. Given $\overline{DE} \parallel \overline{BC}$, $AD = 8$, $BD = 4$, and $AE = 6$, find CE.



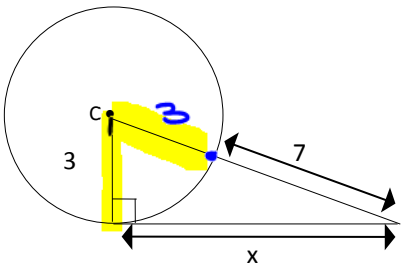
$\frac{8}{4} = \frac{6}{x}$

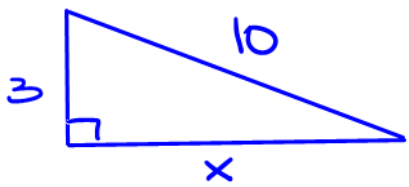
$8x = 6(4)$

$8x = 24$

$x = \frac{24}{8} = \boxed{3}$

6. Find the value of x in the circle below.



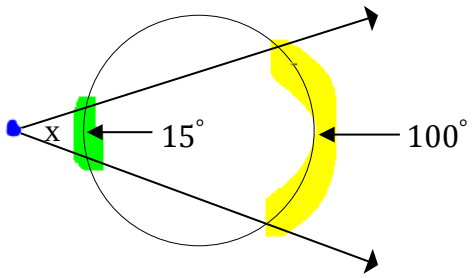


$x^2 + 3^2 = 10^2$ $\quad x^2 + 9 = 100$

$x = \sqrt{100 - 9} = \boxed{\sqrt{91}}$

Review! IN OUT ON

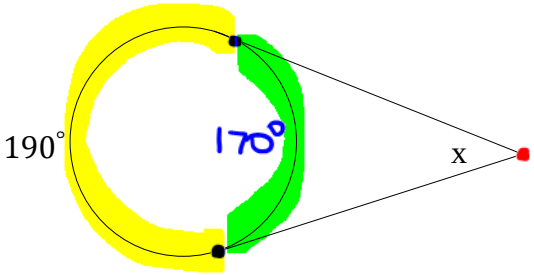
7. Find the value of x in the circle below.



$x = \frac{1}{2}(100 - 15)$

$= \frac{1}{2}(85) = 42.5°$

8. Find the value of x.



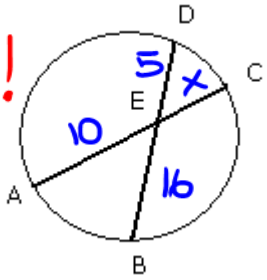
$360 - 190 = 170$

$x = \frac{1}{2}(190 - 170) = \frac{1}{2}(20)$

$= 10°$

9. Find AC given DE = 5, BE = 16, and AE = 10.

Read questions!



$DE \times BE = AE \times CE$

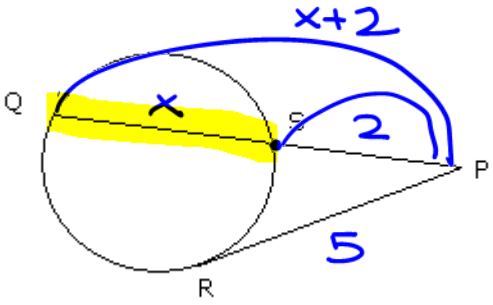
$CE = x$

$5(16) = 10x$

$80 = 10x \quad x = 8$

$AC = 10 + 8 = \boxed{18}$

10. Given PR = 5, PS = 2, find SQ.



$PR^2 = PQ \times SP$

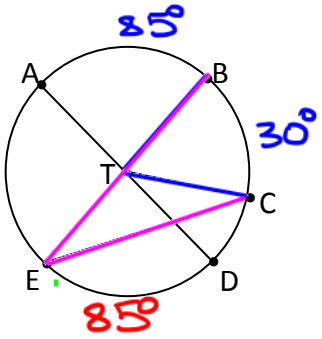
$5^2 = (x+2)2$

$25 = 2x + 4$

$21 = 2x$

$x = \boxed{10.5}$

11. If $m\widehat{AB} = 85^\circ$ and $m\widehat{BC} = 30^\circ$ in a circle T, find $m\widehat{BAE}$, $m\widehat{CD}$, $m\widehat{EAD}$, $m\angle BTC$, and $m\angle BEC$.



$m\overset{\frown}{BAE} = 180^\circ$

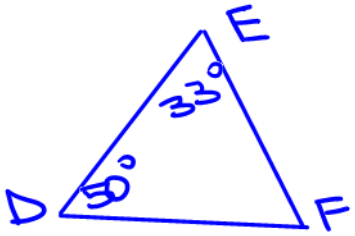
$m\overset{\frown}{CD} = 180 - 85 - 30 = 65^\circ$

$m\overset{\frown}{EAD} = 360 - 85 = 275^\circ$

$m\angle BTC = 30^\circ$

$m\angle BEC = \frac{30}{2} = 15^\circ$

12. Given $\Delta ABC \sim \Delta DEF$ (not shown), $m\angle A = 50^\circ$, $m\angle E = 33^\circ$, and $m\angle D = 2x + 40^\circ$. Find $x, m\angle F$.



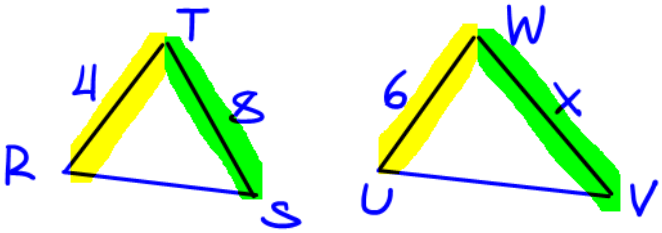
$2x + 40 = 50$

$2x = 10$

$x = 5$

$m\angle F = 180 - 50 - 33 = 97^\circ$

13. Given $\Delta RTS \sim \Delta UWV$ (not shown). Find WV if $RT = 4$, $UW = 6$, and $TS = 8$.



$\frac{RT}{UW} = \frac{TS}{WV}$

$\frac{4}{6} = \frac{8}{x}$

$4x = 6(8)^2$

$x = 12$

14. Name the method that is used to show that ΔRTS is similar to ΔUWV if $WU = 2TR, WV = 2TS$, and $UV = 2RS$.

SSS~

AA~

SAS~

$a^2+b^2=c^2$ right
$a^2+b^2>c^2$ acute
$a^2+b^2<c^2$ obtuse

15. Tell whether each set of numbers represents the lengths of the sides of an acute triangle, an obtuse triangle, of a right, or of no triangle.

a. 12, 13, 14
b. 9, 13, 8
c. $2\sqrt{2}$, $2\sqrt{3}$, 2
d. 5, 11, 7
e. 8, 9, 17

a) $12+13>14$ ✓
$12^2+13^2>14^2$ acute

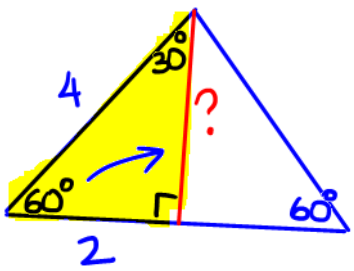
b) $9+8>13$ ✓
$9^2+8^2<13^2$ obtuse

c) $2+2\sqrt{2}>2\sqrt{3}$ ✓
$2^2+(2\sqrt{2})^2$ $(2\sqrt{3})^2$
$4+8=12$ right
$(2\sqrt{2})^2=2^2\cdot(\sqrt{2})^2=4\cdot2=8$

d) $5+7>11$ ✓
$5^2+7^2<11^2$ obtuse

e) $8+9=17$ no Δ

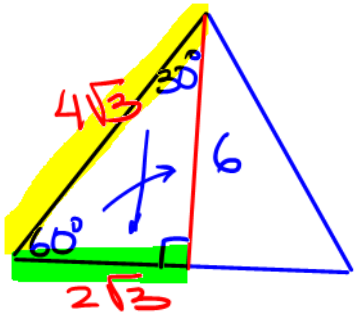
16. Find the length of an altitude of an equilateral triangle if each side is 4 in long.



altitude = $SL\sqrt{3}$ = $\boxed{2\sqrt{3}}$

$LL=SL\sqrt{3}$

17. Find the perimeter of an equilateral triangle if an altitude is 6 in long.



alt. = LL

$SL=\frac{LL}{\sqrt{3}}=\frac{6\cdot\sqrt{3}}{\sqrt{3}\cdot\sqrt{3}}=\frac{6\sqrt{3}}{3}$

$=2\sqrt{3}$

side = Hyp = $4\sqrt{3}$

$P=3(4\sqrt{3})=\boxed{12\sqrt{3}\text{ in}}$

18. State whether the following statement is Always True, Sometimes True, or Never True.

a) *The ratio of perimeters of two similar polygons is equal to their scale factor.*

AT

b) *The ratio of areas of two similar polygons is equal to their scale factor.*

NT

$$\frac{A_1}{A_2} = \left(\frac{s_1}{s_2}\right)^2$$

c) *Any two rectangles are similar.*

ST

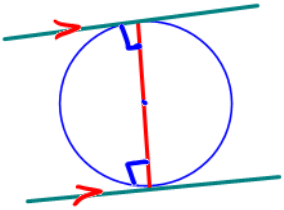
d) *Any two equilateral triangles are similar.*

AT

e) *A trapezoid can be inscribed in a circle.*

AT

f) *Concentric circles with different radii have no common tangents.*

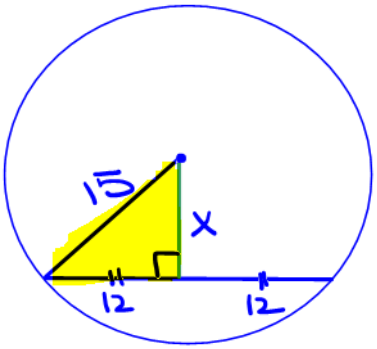


AT

g) *Tangents to a circle at the endpoints of a diameter are parallel.*

AT

19. The length of the radius of a circle is 15. The length of a chord is 24. Find the distance from the center of the circle to the chord.



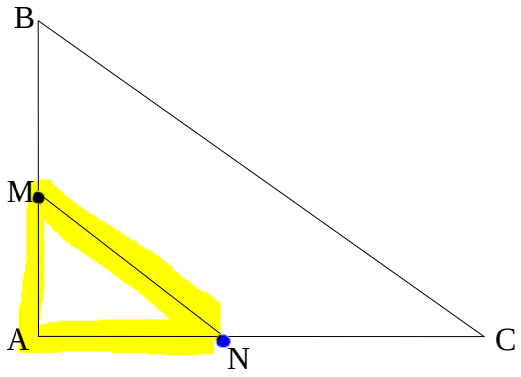
$$x = \sqrt{15^2 - 12^2}$$

$$= \sqrt{81} = \boxed{9}$$

20. Complete the following proof.

Given: ΔABC; M and N are midpoints of $\overline{AB}$ and $\overline{AC}$, respectively.

Prove: $\Delta AMN \sim \Delta ABC$



PROOF	
Statements	**Reasons**
1. ΔABC; M and N are midpoints of $\overline{AB}$ and $\overline{AC}$, respectively.	1. Given
2. $AM = \frac{1}{2}(AB)$ and $AN = \frac{1}{2}(AC)$	2. Def. of midpoint
3. $MN = \frac{1}{2}(BC)$	3. If a line segment joins the midpoints of 2 sides of a Δ, then it is 1/2 of the length of the 3rd side.
4. $\frac{AM}{AB} = \frac{1}{2}$, $\frac{AN}{AC} = \frac{1}{2}$, and $\frac{MN}{BC} = \frac{1}{2}$	4. Divis. prop. of equality.
5. $\frac{AM}{AB} = \frac{AN}{AC} = \frac{MN}{BC}$	5. Substitution.
6. $\Delta AMN \sim \Delta ABC$	6. SSS~