## 2009 Geometry – Individual

(1) $(-2,5)\ (4,-3)$

$m = \frac{-3-5}{4--2} = \frac{-8}{6} = \frac{-4}{3}$

$y = -\frac{4}{3}x + b$

$5 = -\frac{4}{3}(-2)+b$

$5 = \frac{8}{3}+b \Rightarrow b = 5-\frac{8}{3} = \frac{7}{3}$

$y = -\frac{4}{3}x+\frac{7}{3}$

check points

$(\frac{3}{2},7)$: $-\frac{4}{3}(\frac{3}{2})+\frac{7}{3} = -2+\frac{7}{3} = \frac{1}{3}$ WRONG

$\boxed{(\frac{11}{2},-5)}$: $-\frac{4}{3}(\frac{11}{2})+\frac{7}{3} = \frac{-22}{3}+\frac{7}{3} = \frac{-15}{3} = -5$ ✓

$(2,\frac{1}{3})$: $-\frac{4}{3}(2)+\frac{7}{3} = \frac{-8}{3}+\frac{7}{3} = -\frac{1}{3}$ WRONG

$(1,-1)$: $-\frac{4}{3}(1)+\frac{7}{3} = \frac{-4}{3}+\frac{7}{3} = \frac{3}{3} = 1$ WRONG

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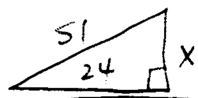
(2) 


$x^2+24^2=51^2$

$x^2+576=2601$

$x^2 = 2025$

$x = \sqrt{2025} = \boxed{45}$

or 8-15-17 Pyth. Triple

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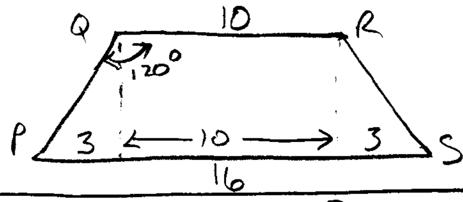
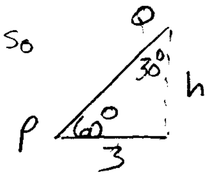
(3) 


$\angle P = 60°$ so




$h = 3\sqrt{3}$ so

$A = \frac{1}{2}(10+16)(3\sqrt{3}) = \boxed{39\sqrt{3}}$

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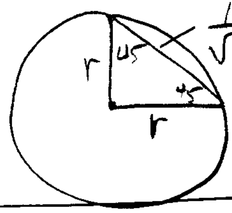
(4) 


$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

because 45-45-90 Δ, $r\sqrt{2} = \frac{\sqrt{2}}{2}$ so $r = \frac{1}{2}$

$A_{circle} = \pi r^2 = \pi(\frac{1}{2})^2 = \boxed{\frac{1}{4}\pi}$

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(5) $A\ (-5,-2)$
$B\ (-3,2)$
$C\ (-1,-2)$

reflect over $y=x$:

$A' = (-2,-5)$
$B' = (2,-3)$
$C' = (-2,-1)$

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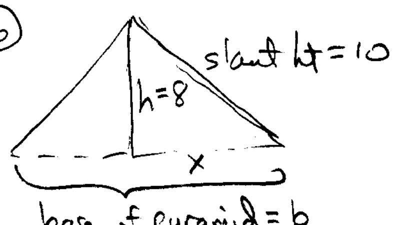
(6) 


$x = 6$ ft

so base length = 12 ft

$SA = B+4(\frac{1}{2}bh)$

$= 12^2+4(\frac{1}{2})(12)(10)$

$= 144+240 = \boxed{384\ ft^2}$

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(7) fabric = 2 ft × 3 ft = 24 in × 36 in = 864 in²

each Δ = $\frac{1}{2}(6)(12) = 36$ in²

$\#\Delta = \frac{864}{36} = \boxed{24}$

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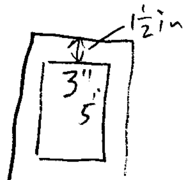
(8) 


outside dimensions are 6" by 8"

$A = 6 \times 8 = \boxed{48\ in^2}$

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(9) $A_{circle} = 18.84 = \pi r^2$

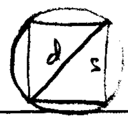
$r^2 = \frac{18.84}{3.14} = 6$

$r = \sqrt{6}$ so $d = 2\sqrt{6} \sim \boxed{4.9\ mm}$

use estimation to get correct answer

2009 Geometry - Individual

(10)




$A_{sq} = 2\text{ in}^2$ so $s = \sqrt{2}$ and $d = s\sqrt{2} = (\sqrt{2})(\sqrt{2}) = 2$

$r = 1$

$\Rightarrow A_{circle} = \pi r^2 = \boxed{\pi}$

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(11) Regular dodecagon (12 sides)

total interior angle $= (n-2)180$
$= 10(180) = 1800$

$\Rightarrow$ each interior $= \frac{1800}{12} = \boxed{150^\circ}$

OR exterior $= 360/12 = 30^\circ$, interior $= 180 - 30 = 150$

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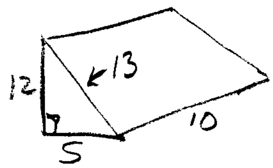
(12)




$SA = 2B + ph$
$= 2(\frac{1}{2})(5)(12) + \overbrace{(5+12+13)}^{30}(10)$
$= 60 + 300 = \boxed{360\text{ ft}^2}$

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(13) right circular cylinder
$V = \pi r^2 h$

$d = \sqrt{72} = 6\sqrt{2}$
so $r = 3\sqrt{2}$

$V = \pi(3\sqrt{2})^2(8\sqrt{2})$
$= \pi(18)(8\sqrt{2}) = \boxed{(144\sqrt{2})\pi}$

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(14) $3\text{yd} \times 3\text{ft} \times 3\text{in} = (108\text{in})(36\text{in})(3\text{in}) = \boxed{11664\text{ in}^3}$

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(15) $SA_A = 24\text{in}^2$
$SA_B = 6\text{in}^2$

ratio $= \frac{24}{6} = \frac{4}{1} = \frac{a^2}{b^2}$

ratio of length $= \frac{a}{b} = \frac{2}{1}$

ratio of volumes $\Rightarrow \frac{a^3}{b^3} = \frac{8}{1}$

$\frac{8}{1} = \frac{V_A}{6} \Rightarrow \boxed{V_A = 48\text{ in}^3}$

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(16) Contrapositive is $\sim B \rightarrow \sim A$

If you do not need a mountain bike then you do not live in California

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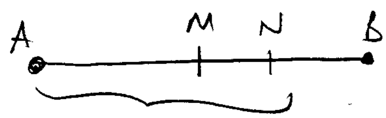
(17)




AN = 60

Find AB $\Rightarrow$ $\frac{3}{4}(AB) = 60$

$AB = 60(\frac{4}{3}) = \boxed{80}$

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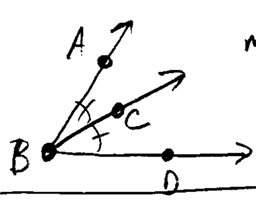
(18)




$m\angle ABC = 28y - 6$
$m\angle CBD = 37 - y$

$$\begin{array}{r} 28y - 6 = 37 - y \\ +y + 6 \quad +6 + y \\ \hline 29y = 43 \end{array}$$

$\boxed{y = \frac{43}{29}}$

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(19) $\perp$ bisector of $\overline{AB}$
$A(-1,2)$ $B(3,-2)$

$m = \frac{-2-2}{3-(-1)} = \frac{-4}{4} = -1$ so $m_\perp = 1$

midpoint $= (1, 0)$

$y = x + b$
$0 = 1 + b \Rightarrow b = -1$

so $\perp$ bisector $\Rightarrow \boxed{y = x - 1}$

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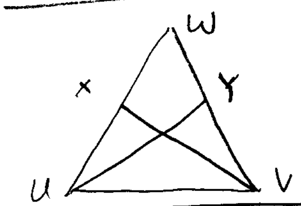
(20) $4x + (2x+10) + (90-x) = 180$
$5x + 100 = 180$
$5x = 80$
$x = 16$

angles: $4(16) = 64^\circ$
$2(16) + 10 = 42^\circ$
$90 - 16 = 74^\circ$

largest − smallest $=$
$74 - 42 = \boxed{32^\circ}$

2009 Geometry - Individual

(21)




$\overline{WU} \cong \overline{WV}$
$\overline{WX} \cong \overline{WY}$
$\angle W \cong \angle W$

$\triangle UYW \cong \triangle VXW$ by $\boxed{SAS}$

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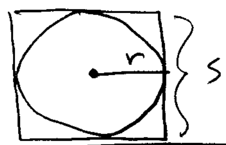
(22)




Inscribed Circle $= A = 3\pi$ so $r = \sqrt{3}$

$s = 2\sqrt{3}$ so Perimeter $= 4s = \boxed{8\sqrt{3}}$

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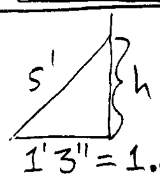
(23)




$h^2 + (1.25)^2 = (5)^2$
$h^2 + 1.5625 = 25$

$h^2 = 23.4375$
$h = \sqrt{23.4375} \sim 4.8'$
$\sim \boxed{4\text{ ft } 10\text{ in}}$

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(24) cube has $V = \sqrt{8}\text{ ft}^3$ so sides $= \sqrt{2}$

corner to corner $= \sqrt{(\sqrt{2})^2 + (\sqrt{2})^2 + (\sqrt{2})^2}$
$= \sqrt{6} \sim 2.45' \sim \boxed{2'5''}$

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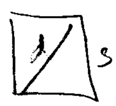
(25)




Area of square $= 20\text{ in}^2$; $s = \sqrt{20} = 2\sqrt{5}$

$d = s\sqrt{2} = (2\sqrt{5})(\sqrt{2}) = \boxed{2\sqrt{10}}$

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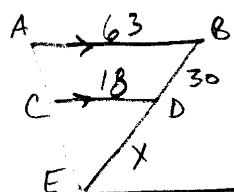
(26)




$\frac{AB}{CD} = \frac{BE}{DE} \Rightarrow \frac{\cancel{63}^{\,7}}{\cancel{18}_{\,2}} = \frac{x+30}{x} \Rightarrow 7x = 2x + 60$

$5x = 60 \Rightarrow \boxed{x = 12}$

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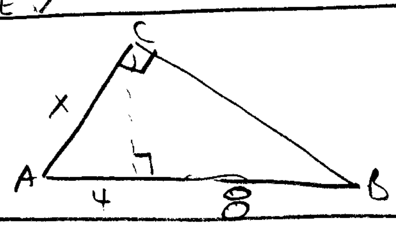
(27)




$x^2 = 4(4+8)$
$x^2 = 4(12) = 48$

$x = \sqrt{48} = \boxed{4\sqrt{3}}$

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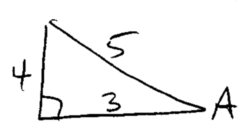
(28) $\sin A = \frac{4}{5}$




$\boxed{\tan A = 4/3}$

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(29) $m\angle B = 3m\angle A$
$m\angle C = 2m\angle B + 10$

$x + 3x + 2(3x) + 10 = 180$
$10x + 10 = 180 \Rightarrow 10x = 170$; $x = 17$
largest angle $= 6x + 10 = 6(17) + 10 = \boxed{112^\circ}$

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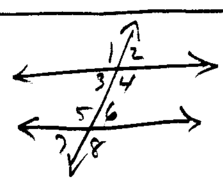
(30)




$m\angle 2 = 8x + 30$
$m\angle 7 = 30x - 25$
$m\angle 2 = m\angle 7$

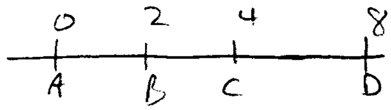
$8x + 30 = 30x - 25$
$-8x + 25 \quad -8x + 25$
$55 = 22x$
$x = 5/2 = 2.5$

$m\angle 2 = 8(2.5) + 30$
$= 50$
$m\angle 1 = 180 - m\angle 2$
$= \boxed{130^\circ}$

2009 Geometry - Individual

(31) $x+y=180$, $x=y-32$ } $y-32+y=180$, $2y=212$ $\nearrow$ $y=106^\circ$

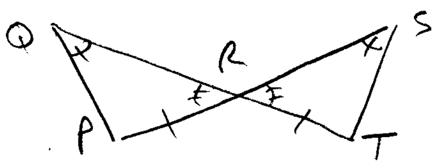
$\boxed{x = 74^\circ = \text{smallest}}$

(32) 


3 units from C = 1 or 7
5 units from B = −1 or 7 } $\boxed{x = 7 \text{ (Between C, D)}}$

(33) 100 ft of fencing = Perimeter   Largest enclosed area = square

so sides = 25'   $A = 25^2 = \boxed{625 \text{ ft}^2}$

(34) 

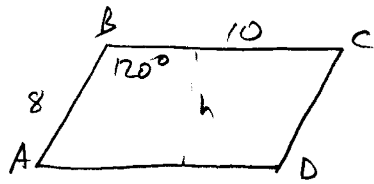

$\overline{PR} \cong \overline{TR}$

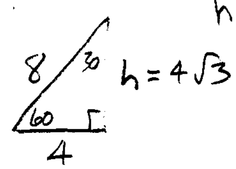
$\angle Q \cong \angle S$

$\triangle QPR \cong \triangle STR$ by $\boxed{AAS}$

(35) Classify triangle 2, 4, 5: $2^2+4^2=20$   $5^2=25$

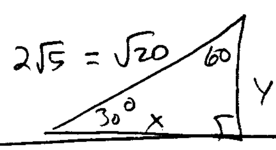
since $20<25$, it is $\boxed{\text{obtuse}}$

(36) 


$h = 4\sqrt{3}$

$A = bh = (10)(4\sqrt{3}) = \boxed{40\sqrt{3}}$

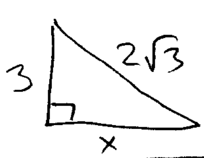
(37) 


$y = \frac{1}{2}(2\sqrt{5}) = \sqrt{5}$

$x = (\sqrt{5})(\sqrt{3}) = \boxed{\sqrt{15}}$

(38) A(−5, −2), B(−3, 2), C(−1, −2) } 8 right, 3 down $\Rightarrow$

$A' = (3, -5)$
$B' = (5, -1)$
$C' = (7, -5)$

(39) 


$x^2 + 3^2 = (2\sqrt{3})^2$

$x^2 + 9 = 12$ $\nearrow$ $x^2 = 3$

$\boxed{x = \sqrt{3}}$

(40) (−9, 2), (3, −10) } $d = \sqrt{(3-{-9})^2 + (-10-2)^2} = \sqrt{12^2 + (-12)^2} = \sqrt{288}$

$= \boxed{12\sqrt{2}}$