3. $L^2 + 4{,}000^2 = 4{,}003^2$
$L^2 = 4{,}003^2 - 4{,}000^2$
$L^2 = 16{,}024{,}009 - 16{,}000{,}000$
$L^2 = 24{,}009$
$L = \sqrt{24{,}009} \approx 155$ mi
4. $29{,}035 \div 5{,}280 \approx 5$ mi
5. $L^2 + 4{,}000^2 = 4{,}005^2$
$L^2 + 16{,}000{,}000 = 16{,}040{,}025$
$L^2 = 16{,}040{,}025 - 16{,}000{,}000$
$L^2 = 40{,}025$
$L = \sqrt{40{,}025} \approx 200$ mi
6. $555 \div 5{,}280 \approx .1$
$L^2 + 4{,}000^2 = 4{,}000.1^2$
$L^2 + 16{,}000{,}000 = 16{,}000{,}800.00$
$L^2 = 16{,}000{,}801.01 - 16{,}000{,}000$
$L^2 = 800.01$
$L = \sqrt{800.01} \approx 28.3$ mi
7. $150^2 + 4{,}000^2 = (X + 4{,}000)^2$
8. $X^2 + 8{,}000X + 16{,}000{,}000$
9. $22{,}500 + 16{,}000{,}000 = X^2$
$+8{,}000X + 16{,}000{,}000$
$22{,}500 = X^2 + 8{,}000X$
$0 = X^2 + 8{,}000X - 22{,}500$
or $X^2 + 8{,}000X - 22{,}500 = 0$
10. $8{,}000X = 22{,}500$
$X = 22{,}500 \div 8{,}000$
$X \approx 2.8$ mi

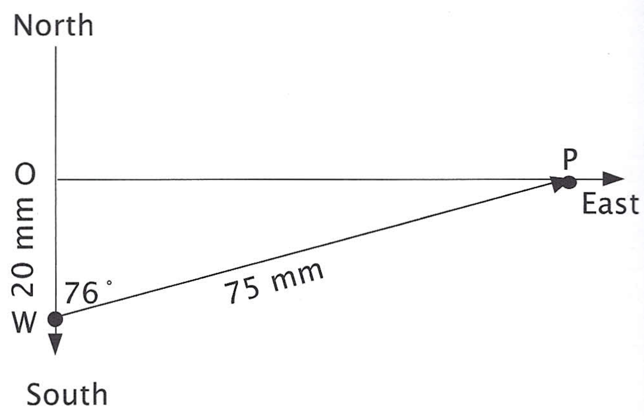
Honors Lesson 19

1. V = area of base x altitude
$V = (4 \cdot 4)(8)$
$V = 128 \text{ in}^3$
2. $SA = 2(4\text{x}4) + 2(4\text{x}8) + 2(4\text{x}8)$
$SA = 2(16) + 2(32) + 2(32)$
$SA = 32 + 64 + 64$
$SA = 160 \text{ in}^2$
3. V = area of base x altitude
$V = \frac{1}{2}(3\text{x}4)\text{x}10$
$Y = 60 \text{ ft}^3$
4. $SA = (2)\ \frac{1}{2}(3\text{x}4)\ + (3\text{x}10) +$
$(4\text{x}10) + (5\text{x}10)$
$SA = 12 + 30 + 40 + 50$
$SA = 132 \text{ ft}^2$
5. Think of the wire as a long, skinny cylinder.
$1 \text{ ft}^3 = 12\text{x}12\text{x}12 = 1{,}728 \text{ in}^3$
Volume of wire = area of base x length
$1{,}728 = (3.14\text{x}1^2)\text{x L}$
$1{,}728 = .0314L$
$5{,}5031.8 \text{ in} \approx L$
$5{,}5031.8 \div 12 \approx 4{,}586$ ft
6. $A = LW$ Let L = the circumference and W = the height of the cylinder.
Diameter = 9, so $L = 3.14(9)$
$28.26 \text{ in} \approx L$ This is one dimension of the rectangle and the circumference of the cylinder.
$625 = 28.26W$
$22.12 \text{ in} = W$ This is the other dimension of the rectangle and the height of the cylinder.
V = area of base x height
$V = 3.14(9 \div 2)^2 \text{ x } 22.12$
$V = 3.14(4.5)^2 \text{ x } 22.12$
$V \approx 1{,}406.5 \text{ in}^3$

7. Cylinder will be four in high and four in^3 in diameter area of one circular end $= 3.14(2)^2 = 12.56\ in^2$
   area of side $= 3.14(4) \times 4 = 50.24\ in^2$
   $50.24 + 12.56 + 12.56 = 75.36\ in^2$
   You also could have used what you learned in Lesson 17 to find the surface area of the cylinder. First find the surface area of the sphere, and then multiply by $\frac{3}{2}$. (See below for an alternative solution.)
7. alternative solution
   SA of sphere $= 4(3.14)(2)^2 =$
   $50.24\ in^2$
   $\frac{3}{2}$ or $1.5(50.24) = 75.36\ in^2$
8. $A = 2(4x4) + 2(4x4) + 2(4x4)$
   $A = 32 + 32 + 32 = 96\ in^2$
   The cylinder uses less cardboard. (However, there will be odd-shaped, possibly unuseable pieces left over.)

Honors Lesson 20

1. $300 \div 150 = 2$ hours
2. answers may vary
   The wind blew him off course.
3. $30 \div 2 = 15$ mm
4. $150 \div 2 = 75$ mm
5. $\angle OWP = 80°$
6. $\angle OWP = 75°$
   See drawing.
   Your answers to #5 and #6 may vary slightly depending how carefully you drew and measured.



Honors Lesson 21

1. πy^2
2. $A = \pi x^2 - \pi y^2$
3. $y^2 + z^2 = x^2$
   $z^2 = x^2 - y^2$
4. $A = \pi\left(x^2 - y^2\right)$
5. $A = \pi\left(z^2\right)$
6. $A = \pi\left(z^2\right)$
   $A = \pi\ \frac{10}{2}^{\,2}$
   $A = \pi(5)^2$
   $A = 3.14 \times 25$
   $A = 78.5\ in^2$
7. $A = 3.14(4)^2$
   $A = 3.14x16 = 50.24\ in^2$
8. $A = L x W$
   $50.24 = L \times .007$
   $50.24 \div .007 \approx 7{,}177$ in
9. $7{,}177 \div 2 \approx 3{,}589$ tickets (rounded to the nearest whole number)