

5.7 Component Vectors

3. Answers:

$$c. \cos 12^\circ = \frac{\bar{x}}{15.9}, \sin 12^\circ = \frac{\bar{y}}{15.9}, x = 15.6, y = 3.3$$

4. magnitude = 33.2, direction = 75.2° from the smaller force

5. magnitude = 304, 18.3° between resultant and larger force

6. $y = 12 \sin 28.2^\circ = 5.7, x = 12 \cos 28.2^\circ = 10.6$

7. Answer:

- Recall that headings and angles in triangles are complementary.
- So, an 83° heading translates to 7° from the horizontal.
- Adding that to 35° (270° from 305°) we get 42° for two of the angles in the parallelogram.
- So, the other angles in the parallelogram measure 138° each, $\frac{360 - 2(42)}{2}$.
- Using 138° in the Law of Cosines, we can find the diagonal or resultant, $x^2 = 42^2 + 155^2 - 2(42)(155) \cos 138$, so $x = 188.3$.
- We then need to find the angle between the resultant and the speed using the Law of Sines. $\frac{\sin a}{42} = \frac{\sin 138}{188.3}$, so $a = 8.6^\circ$.
- To find the actual heading, this number needs to be added to 83° , getting 91.6° .

8. The heading is just $\tan \theta = \frac{2}{10}$, or 11.3° against the current.

9. \vec{BA} is the same vector as \vec{AB} , but because it starts with B it is in the opposite direction. Therefore, when you add the two together, you will get $(0,0)$.