



7. Is the horizontal velocity of a projectile constant? Is the vertical velocity of a projectile constant? Explain your answers. (1)

8. Why does a projectile move in a curved path? (1)

9. You kick a ball off the ground with a horizontal speed of 15 m/s and a vertical speed of 19.6 m/s. As it moves upward, its vertical speed \_\_\_\_\_ by \_\_\_\_\_ each second. It gets to its highest point \_\_\_\_\_ seconds after it is kicked. At the highest point, its vertical speed is \_\_\_\_\_ and its horizontal speed is \_\_\_\_\_. (1)

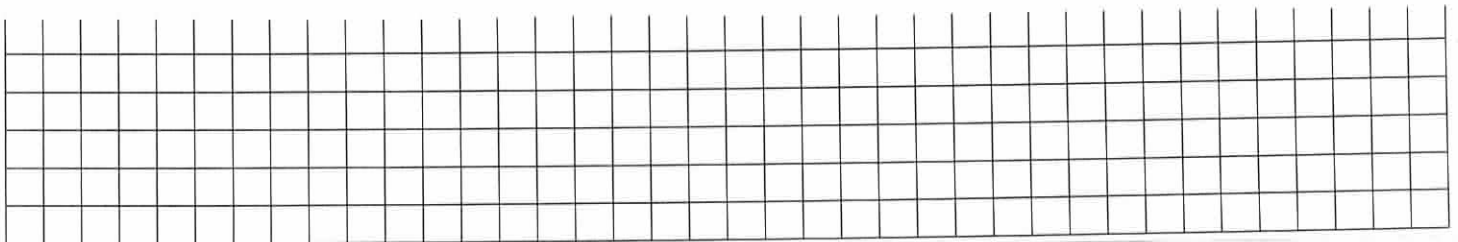
10. At which angle should you kick a soccer ball if you want it to have the greatest range? (0.5)

11. A ball kicked off the ground at an angle of 20 degrees and a ball kicked at an angle of \_\_\_\_\_ degrees have the same range. (0.5)

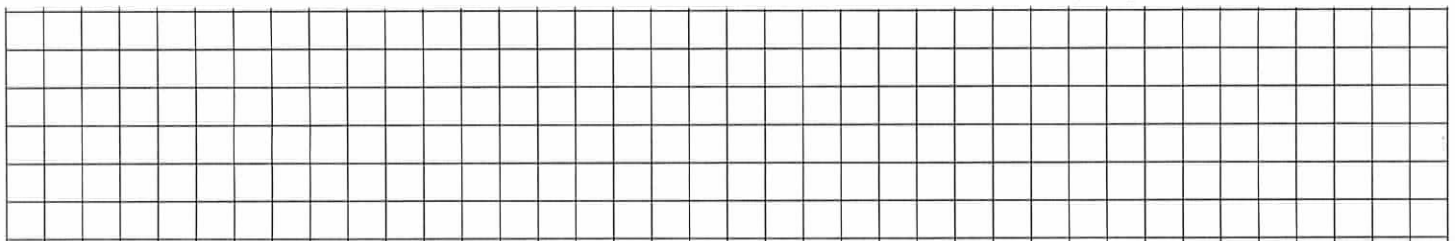
### Solving Problems

1. Use a **scaled drawing** and a protractor to find the displacement for each of the following. Then check your work using the **Pythagorean theorem**. (3)

a. an ant that walks 3 m north and 3 m east. Use a scale of 1 cm = 2 m (1 square = 1 m<sup>2</sup>).

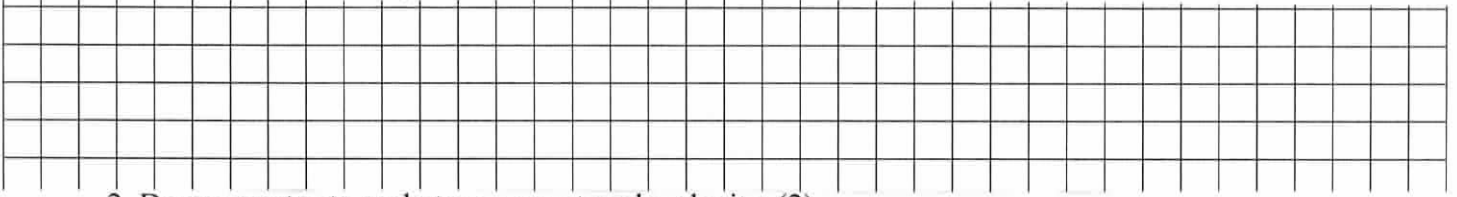


b. a cat who runs 6 m west and 2 m north Use a scale of 1 cm = 2m (1 square = 1 m<sup>2</sup>).



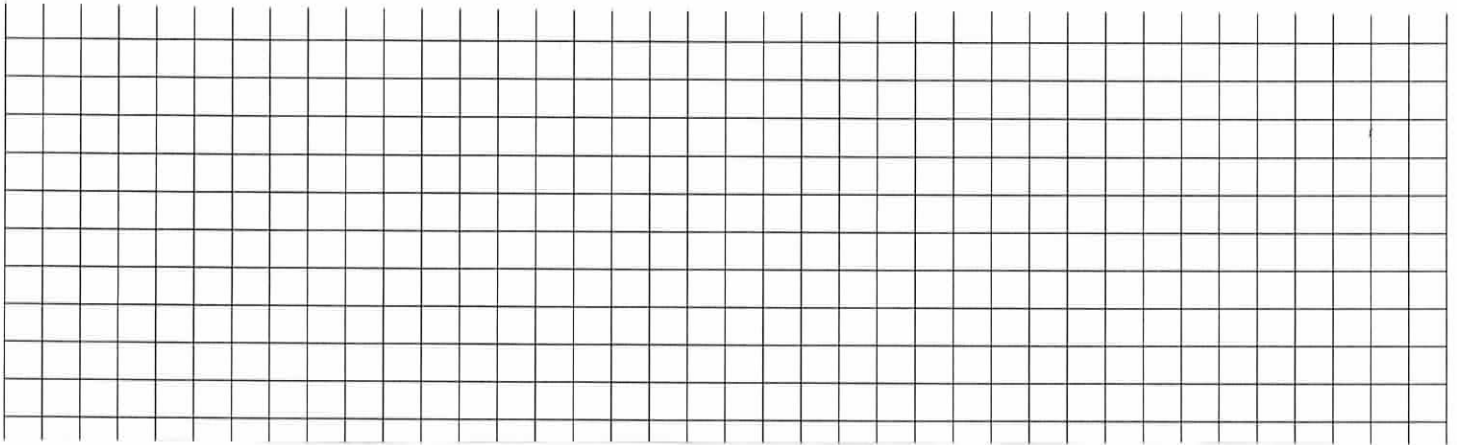
d. a plane that flies 200 mi north, turns, and flies 200 mi south. Use a scale of

1 cm = 200 mi (1 square = 100 mi x 100 mi).

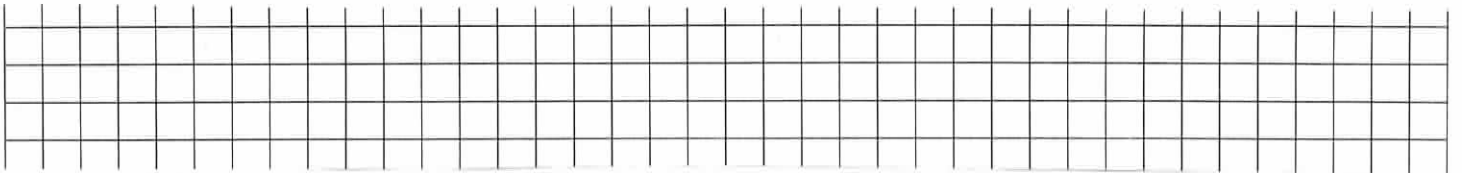


2. Draw a vector to scale to represent each velocity. (2)

a. (20 m/s,  $60^\circ$ ) [Use a scale of 1 cm = 4 m/s (1 square = 2 m/s x 2 m/s).]

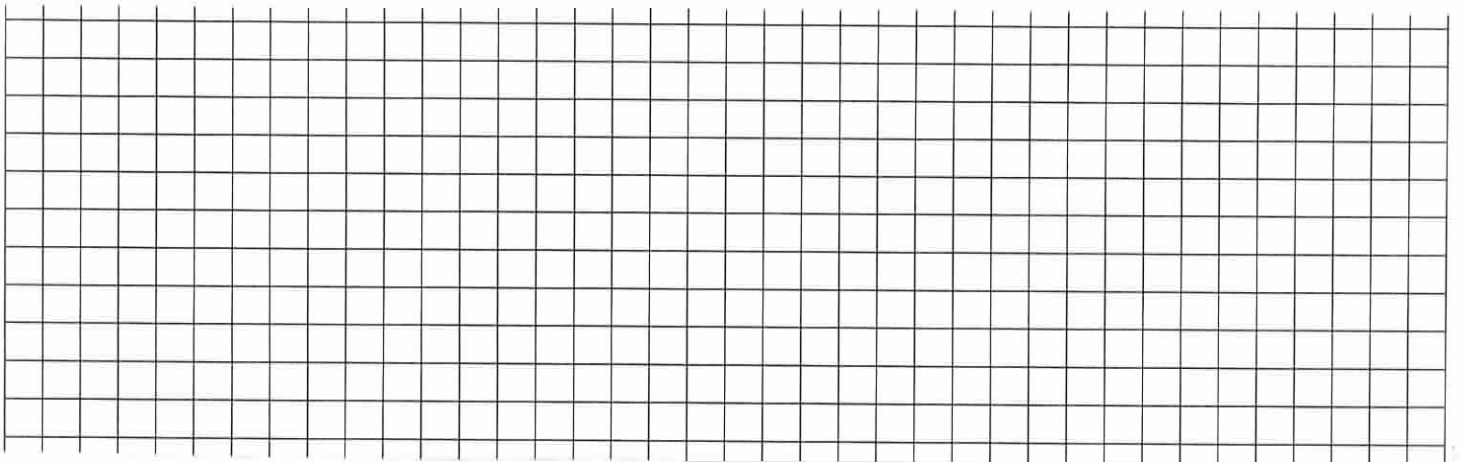


c. (500 km/h,  $180^\circ$ ) [Use a scale of 1 cm = 200 km/h (1 square = 100 km/h x 100 km/h).]

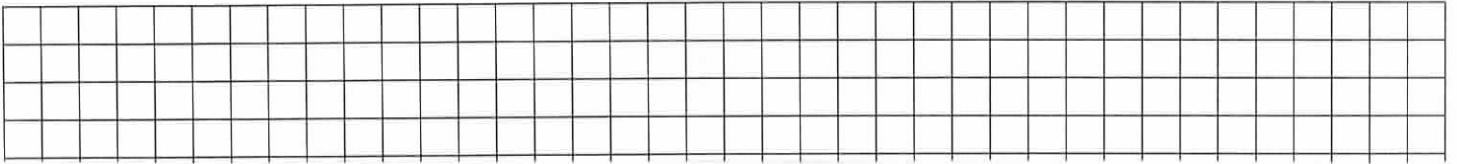


3. Calculate the speed of each velocity given in component form. Then draw the velocity vector to scale. (2)

a. (5, 8) m/s [Draw with a scale of 1 cm = 2 m/s (1 square = 1 m/s x 1 m/s).]



b. (60, 20) m/s [Draw with a scale of 1 cm = 20 m/s (1 box = 10 m/s x 10 m/s).]



4. You run straight off a high diving board at a speed of 6 m/s. You hit the water 2 s later. (2)

a. How far did you travel horizontally during the 2 s?

b. How far did you travel vertically during the 2 s?

c. How fast were you moving horizontally when you hit the water?

d. How fast were you moving vertically when you hit the water?

5. A monkey throws a banana horizontally from the top of a tree, as illustrated on page 162. The banana hits the ground 3 s later and lands 30 m from the base of the tree. (2.5)

a. How fast did the monkey throw the banana?

b. How high is the tree?

c. How fast was the banana moving horizontally as it hit the ground?

d. How fast was the banana moving vertically as it hit the ground?

e. What was the resultant velocity of the banana as it hit the ground? Make a scale drawing on the next page to find the angle at which the banana hit the ground.

Scale: 1 cm = 2 m/s (1 box = 1 m/s x 1 m/s)

6. A bowling ball rolls off a high cliff at 5 m/s. Complete the chart that describes its motion during each second it is in the air. (4)

Time (s)	Horizontal velocity (m/s)	Vertical velocity (m/s)	Horizontal distance (m)	Vertical distance (m)
0				
1				
2				
3				
4				

7. An astronaut drops a ball off the edge of a crater on the Moon, where gravity is  $1.6 \text{ m/s}^2$ . If it takes 5 seconds for the ball to reach the bottom of the crater, what is the depth of the crater? (0.5)

