

CHAPTER 3

11. Arvin the Ant is on a picnic table. He travels 30 cm eastward, then 25 cm northward and finally 15 cm westward. What is the magnitude of Arvin's net displacement?
- a. 70 cm
 - b. 57 cm
 - c. 52 cm
 - d. 29 cm
12. Arvin the Ant travels 30 cm eastward, then 25 cm northward and finally 15 cm westward. What is Arvin's direction of displacement with respect to his original position?
- a. 59° N of E
 - b. 29° N of E
 - c. 29° N of W
 - d. 77° N of E
13. A student adds two vectors with magnitudes of 200 and 40. Which one of the following is the only possible choice for the magnitude of the resultant?
- a. 100
 - b. 200
 - c. 260
 - d. 40
22. Five boys are pushing on a snowball, and each is pushing with a force of 10.0 N. However, each boy is pushing in a different direction. They are pushing north, northeast, east, southeast, and south. (Each boy is pushing at an angle of 45.0° relative to his neighbor.) What is the magnitude of the total force on the ball?
- a. 0
 - b. 17.1 N
 - c. 24.1 N
 - d. 27.1 N
23. John throws a baseball from the outfield from shoulder height, at an initial velocity of 29.4 m/s at an initial angle of 30.0° with respect to the horizontal. The ball is in its trajectory for a total interval of 3.00 s before the third baseman catches it at an equal shoulder-height level. (Assume air resistance negligible.) What is the ball's horizontal displacement?
- a. 76.4 m
 - b. 38.2 m
 - c. 57.3 m
 - d. zero
24. A baseball thrown from the outfield is released from shoulder height at an initial velocity of 29.4 m/s at an initial angle of 30.0° with respect to the horizontal. If it is in its trajectory for a

- total of 3.00 s before being caught by the third baseman at an equal shoulder-height level, what is the ball's net vertical displacement during its 3-s trajectory?
- a. 11.0 m
 - b. 9.80 m
 - c. 22.1 m
 - d. zero
25. A baseball thrown from the outfield is released from shoulder height at an initial velocity of 29.4 m/s at an initial angle of 30.0° with respect to the horizontal. What is the maximum vertical displacement that the ball reaches during its trajectory?
- a. 11.0 m
 - b. 9.80 m
 - c. 22.1 m
 - d. 44.1 m
26. A baseball is thrown by the center fielder (from shoulder level) to home plate where it is caught (on the fly at an equal shoulder level) by the catcher. At what point is the ball's speed at a minimum? (air resistance is negligible)
- a. just after leaving the center fielder's hand
 - b. just before arriving at the catcher's mitt
 - c. at the top of the trajectory
 - d. speed is constant during entire trajectory
27. A baseball is thrown by the center fielder (from shoulder level) to home plate where it is caught (on the fly at shoulder level) by the catcher. At what point is the magnitude of the acceleration at a minimum? (air resistance is negligible)
- a. just after leaving center fielder's hand
 - b. just before arriving at catcher's mitt
 - c. at the top of the trajectory
 - d. acceleration is constant during entire trajectory
28. A baseball is thrown by the center fielder (from shoulder level) to home plate where it is caught (on the fly at shoulder level) by the catcher. At what point does the magnitude of the vertical component of velocity have its minimum value? (air resistance is negligible)
- a. just after leaving center fielder's hand
 - b. just before arriving at catcher's mitt
 - c. at the top of the trajectory
 - d. magnitude of vertical component of velocity is constant
29. A helicopter is traveling at 40 m/s at a constant altitude of 100 m over a level field. If a wheel falls off the helicopter, with what speed will it hit the ground? ($g = 9.8 \text{ m/s}^2$ and air resistance negligible)
- a. 40 m/s
 - b. 50 m/s

- c. 60 m/s
 - d. 70 m/s
30. A ball is rolled horizontally off a table with an initial speed of 0.24 m/s. A stopwatch measures the ball's trajectory time from table to the floor to be 0.30 s. What is the height of the table? ($g = 9.8 \text{ m/s}^2$ and air resistance is negligible)
- a. 0.11 m
 - b. 0.22 m
 - c. 0.33 m
 - d. 0.44 m
31. A ball is rolled horizontally off a table with an initial speed of 0.24 m/s. A stop watch measures the ball's trajectory time from table to the floor to be 0.30 s. How far away from the table does the ball land? ($g = 9.8 \text{ m/s}^2$ and air resistance is negligible)
- a. 0.055 m
 - b. 0.072 m
 - c. 1.2 m
 - d. 1.9 m
32. A stone is thrown at an angle of 30° above the horizontal from the top edge of a cliff with an initial speed of 12 m/s. A stop watch measures the stone's trajectory time from top of cliff to bottom to be 5.6 s. What is the height of the cliff? ($g = 9.8 \text{ m/s}^2$ and air resistance is negligible)
- a. 58 m
 - b. 154 m
 - c. 120 m
 - d. 197 m
33. A stone is thrown at an angle of 30° above the horizontal from the top edge of a cliff with an initial speed of 12 m/s. A stop watch measures the stone's trajectory time from top of cliff to bottom to be 5.6 s. How far out from the cliff's edge does the stone travel horizontally? ($g = 9.8 \text{ m/s}^2$ and air resistance is negligible)
- a. 58 m
 - b. 154 m
 - c. 120 m
 - d. 197 m
34. A stone is thrown with an initial speed of 15 m/s at an angle of 53° above the horizontal from the top of a 35 m building. If $g = 9.8 \text{ m/s}^2$ and air resistance is negligible, then what is the magnitude of the vertical velocity-component of the rock as it hits the ground?
- a. 9.0 m/s
 - b. 18 m/s
 - c. 26 m/s
 - d. 29 m/s

35. A stone is thrown with an initial speed of 15 m/s at an angle of 53° above the horizontal from the top of a 35 m building. If $g = 9.8 \text{ m/s}^2$ and air resistance is negligible, then what is the magnitude of the horizontal component of velocity as the rock strikes the ground?
- a. 7.5 m/s
 - b. 9.0 m/s
 - c. 12 m/s
 - d. 29 m/s
36. A stone is thrown with an initial speed of 15 m/s at an angle of 53° above the horizontal from the top of a 35 m building. If $g = 9.8 \text{ m/s}^2$ and air resistance is negligible, then what is the speed of the rock as it hits the ground?
- a. 15 m/s
 - b. 21 m/s
 - c. 30 m/s
 - d. 36 m/s
37. A stone is thrown with an initial speed of 15 m/s at an angle of 53° above the horizontal from the top of a 35 m building. If $g = 9.8 \text{ m/s}^2$ and air resistance is negligible, what is the magnitude of the horizontal displacement of the rock?
- a. 38 m
 - b. 46 m
 - c. 66 m
 - d. 90 m
43. A boat moves at 10.0 m/s relative to the water. If the boat is in a river where the current is 2.00 m/s, how long does it take the boat to make a complete round trip of 1 000 m upstream followed by a 1 000-m trip downstream?
- a. 200 s
 - b. 203 s
 - c. 208 s
 - d. 250 s
44. A river flows due east at 3.0 m/s. A boat crosses the 300-m-wide river by maintaining a constant velocity of 10 m/s due north relative to the water. If no correction is made for the current, how far downstream does the boat move by the time it reaches the far shore?
- a. 6 m
 - b. 30 m
 - c. 60 m
 - d. 90 m
46. A ball is launched from ground level at 30 m/s at an angle of 35° above the horizontal. How far does it go before it is at ground level again?

- a. 14 m
- b. 21 m
- c. 43 m
- d. 86 m

Chapter 3, Vectors and Two-Dimensional Motion

47. A baseball leaves the bat with a speed of 44.0 m/s and an angle of 30.0° above the horizontal. A 5.0-m-high fence is located at a horizontal distance of 132 m from the point where the ball is struck. Assuming the ball leaves the bat 1.0 m above ground level, by how much does the ball clear the fence?
- a. 4.4 m
 - b. 8.8 m
 - c. 13.4 m
 - d. 17.9 m
48. Wiley Coyote has missed the elusive road runner once again. This time, he leaves the edge of the cliff at 50.0 m/s horizontal velocity. If the canyon is 100 m deep, how far from his starting point at the edge of the cliff does the coyote land?
- a. 226 m
 - b. 247 m
 - c. 339 m
 - d. 400 m
49. A fireman, 50.0 m away from a burning building, directs a stream of water from a fire hose at an angle of 30.0° above the horizontal. If the initial speed of the stream is 40.0 m/s, at what height will the stream of water strike the building?
- a. 9.60 m
 - b. 13.4 m
 - c. 18.7 m
 - d. 22.4 m
51. Vector **A** is 3 m long and vector **B** is 4 m long. The length of the sum of the vectors is
- a. 5 m.
 - b. 7 m.
 - c. 12 m.
 - d. some value from 1 m to 7 m.

52. When three vectors are added graphically and form a closed triangle, the largest enclosed angle between any two of the vectors cannot be greater than
- a. 60°
 - b. 90°
 - c. 180°
 - d. no maximum exists

CHAPTER 3 - ANSWERS

#	Ans	Difficulty	#	Ans	Difficulty
1.	B	1	29.	C	2
2.	B	1	30.	D	2
3.	A	1	31.	B	2
4.	B	1	32.	C	3
5.	A	1	33.	A	3
6.	C	1	34.	D	2
7.	A	1	35.	B	2
8.	D	2	36.	C	3
9.	B	2	37.	A	3
10.	D	2	38.	B	2
11.	D	2	39.	D	3
12.	A	2	40.	A	2
13.	B	1	41.	B	3
14.	D	2	42.	A	2
15.	C	2	43.	C	3
16.	B	2	44.	D	2
17.	D	2	45.	C	2
18.	D	2	46.	D	3
19.	D	2	47.	C	3
20.	B	2	48.	B	2
21.	A	1	49.	C	2
22.	C	2	50.	A	3
23.	A	2	51.	D	2
24.	D	2	52.	C	2
25.	A	2	53.	B	1
26.	C	2	54.	C	1
27.	D	1	55.	D	2
28.	C	1	56.	B	2

