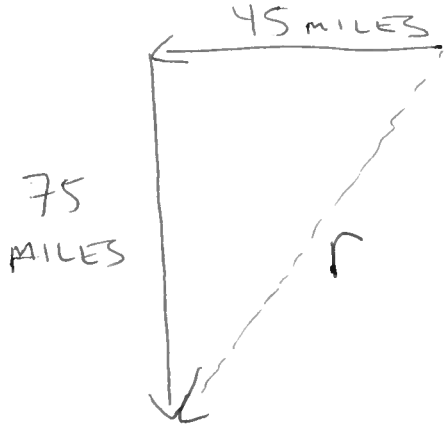
Name SOLUTIONS Date _____

59	Vectors and More

$d = vt$ $v_f = v_i + at$ $d = v_i t + (1/2)at^2$ $g = 9.8\ m/s^2$

1) A person travels 45 miles to the west. They then travel 75 miles to the south. Draw a head to tail diagram for this scenario. Calculate the person's resultant displacement. In other words, calculate how far they are from their starting point.



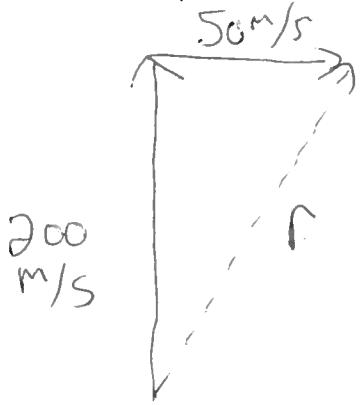
$r^2 = 45^2 + 75^2$

$r^2 = 7650$

$r = \sqrt{7650}$

$r = \boxed{87.5 \text{ MILES}}$

2) A plane heads to the north at 200 m/s but a wind pushes it to the east at 50 m/s.
   a) What is the resultant velocity of the plane?
   b) How far does the plane travel in 2 hours?



a) $r^2 = 50^2 + 200^2$

$r^2 = 42500$

$r = \sqrt{42500}$

$r = 206\ m/s$

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b) $v = 206\ \frac{m}{s}$

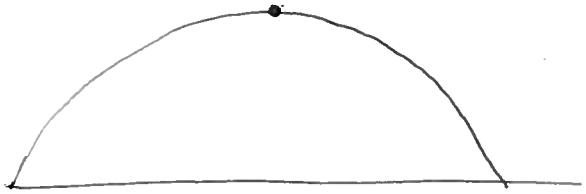
$t = 2\ hours \times \frac{60\ min}{hr} \times \frac{60\ s}{min} = 7200\ s$

$d = vt$

$d = (206)(7200) = \boxed{1,483,200\ m}$

$d = vt$ $v_f = v_i + at$ $d = v_i t + (1/2)at^2$ $g = 9.8\ m/s^2$

3) A projectile is fired from the ground at an angle. The velocity of the projectile is initially 30 m/s in the horizontal direction and 60 m/s in the vertical direction.
   a) What is the hang time for the projectile?
   b) What is the maximum height for the projectile?
   c) What is the range of the projectile?



X

$V = 30\ m/s$

$t = 12.2\ s$

c) $d = vt$

$d = (30)(12.2)$

$d = \boxed{366\ m}$

Y ON THE WAY DOWN

$V_i = 0\ \frac{m}{s}$

$a = 9.8\ m/s^2$

$V_F = 60\ \frac{m}{s}$

$V_F = V_i + at$

$60 = V_i + (9.8)t$

$\frac{60}{9.8} = t = 6.1\ s$

a) HANG TIME $= 6.1 \times 2 = \boxed{12.2\ s}$

b) $d = v_i t + \frac{1}{2}at^2$

$d = \frac{1}{2}(9.8)t^2$

$d = 4.9t^2$

$d = 4.9(6.1)^2$

$d = \boxed{182\ m}$

$d = vt$ $v_f = v_i + at$ $d = v_i t + (1/2)at^2$ $g = 9.8\ m/s^2$

4) A car travels at a constant speed for 7 seconds. The car then accelerates at 4 m/s^2 for 5 seconds. During the 5 seconds of acceleration, the car travels 200 m. How far does the car travel all together?

PART 1

$t = 7s$

$V = 30 m/s$

$d = vt$

$d = (30)(7)$

$d = 210m$

PART 2

$a = 4 m/s^2$

$t = 5s$

$d = 200m$

$d = v_i t + \frac{1}{2}at^2$

$200 = V_i(5) + \frac{1}{2}(4)(5)^2$

$200 = V_i(5) + 50$

$150 = V_i(5)$

$\frac{150}{5} = V_i = 30 m/s$

TOTAL DISTANCE = 210 + 200

410 m

Answers: 1) 87.5 m 2a) 206 m/s b) 1,483,200 m 3a) 12.2 s b) 183 m c) 366 m 4) 410 m