Kate.

9.0 mg

9.1 - I'm in motion to the 1st + 3rd guards, + not in motion to the 2nd.

9.2 - $\frac{115 \text{ miles}}{0.5 \text{ hr}} = \boxed{230 \text{ mph}}$

9.3 - $\frac{5 \text{ m}}{12 \text{ hrs}} = \frac{5000 \text{ mm}}{720 \text{ min}} = \boxed{6.94 \text{ mm/min}}$ (5 m × 1000 mm / 1 m)

9.4 - b.- 34 m/min east

9.5 - 1170 mph toward eachother.

9.6 - $\frac{12}{3} =$ $\boxed{4 \text{ m/s}^2 \text{ down the hill.}}$

9.7 - $\frac{-12}{6} =$ $\boxed{2 \text{ m/s}^2 \text{ west}}$

9.8 - $\frac{0.15 \text{ m/m}}{3 \text{ sec}} = \frac{0.15 \text{ m/m}}{0.05 \text{ m}} = \boxed{3 \text{ m/m}^2 \text{ south}}$

9.9 - $\frac{1}{2}\left(\frac{32 \text{ feet}}{\text{sec}^2}\right)(1.1 \text{ sec})^2$

$\frac{1}{2}\left(\frac{32 \text{ feet}}{\text{sec}^2}\right)(1.21 \text{ sec})$

16 feet × 1.21 = $\boxed{19.36 \text{ ft.}}$

9.10 - 1. might not yell at the presice time
2. might not start or stop the stopwatch @ the exact time.

230 / 5)1150

60 × 12 / 120 / 60 / 1800

date

study guide m9

1. Reference point - a point against which position is measured.
Vector quantity - a physical measurement that contains directional info.
Scalar quantity - a physical measurement that doesn't contain directional info.
acceleration - The time rate of change of an object's velocity.
Free fall: The motion of an object when it's falling solely under the influence of gravity.
2. no.
3. It depends what it's relative to
4. a. relative to the girls
b. relative to the child
c. relative to the first girl.
5. 20 miles/hour
6. $\frac{6\text{ km}}{45\text{ min.}} = 6\text{ km} \cdot \left(\frac{1000\text{ m}}{1\text{ km}}\right) = \frac{6000\text{ m}}{2{,}700\text{ sec}} =$ ~~0.0167 m/sec~~
$\frac{6000\text{ m}}{2700} = \boxed{2.2\text{ m/sec}}$

60 / 45 / 300 / 2700 / 2700

7. ~~10 meters - distance~~
a. 10 meters - scalar, distance
b. 1.2 meters/second^2 east - vector, acceleration
c. 3.4 feet/hour + slowing - scalar, speed
d. 56 liters - scalar, none of these.
e. 7.2 miles/min west - vector, velocity
f. 2.2 mm/year - speed, scalar
8. 12 mph. towards eachother
a. acceleration = 0, because the velocity stays the same.
10. $\frac{12}{2}$ = 6 meters/second^2 east
11. $\frac{-30\text{ mph}}{0.2\text{ h}} = 150\text{ mph}^2$ north.

12. Because all objects experience some air resistance.
13. Because air resistance is so small on heavy objects that we can usually kinda ignore it.
14. They hit at the same time.
15. $\frac{1}{2}(\text{acc})(\text{time})^2$

$\frac{1}{2}\left(\frac{9.8\ m}{sec^2}\right)(4.1)^2$

$\left(\frac{4.9\ m}{sec^2}\right) 16.81\ sec^2 =$ **82.4 meters**

16. $16\ sec^2 \cdot 49 =$ **784 ft.**
17. opposite direction

4.1
×4.1
41
1640
16.81

my notes

- Position must always be given ~~relative~~ to something else, called a reference point

> ALL MOTION IS RELATIVE.

* speed = $\frac{\text{distance traveled}}{\text{time traveled}}$ don't forget units!

VELOCITY vs. SPEED

v = how quickly an object moves & in what direction it's moving.
v = a vector quantity

s = just how quickly an object moves.
s = a scalar quantity.

when objects travel in the same direction, their relative speed is the difference between their individual speeds. when they travel in opposite directions, relative speed is the sum of their individual speeds.

relative speeds:
same direction = subtract
different direction = add

ACCELERATION

Acceleration- the time rate of change of an object's velocity.

* $a = \frac{\text{final velocity} - \text{initial velocity}}{\text{time}}$

> Units ex: feet per second^2, miles per hour^2, meters per second^2, etc.

If speeding up, the acceleration is in the same direction as velocity. If slowing down, acceleration is in the opposite direction as the velocity.

Make sure all units agree with one another!

ACCELERATION DUE TO GRAVITY

free fall – the motion of an object when it is falling solely under the influence of gravity.

– Heavy objects fall faster than lighter objects not bc their acceleration due to gravity is larger, but because they have less air resistance.

When we neglect air resistance, all objects falling near the surface of the earth accelerate quickly.

$\text{distance} = \frac{1}{2}(\text{acc.})(\text{time})^2$

* ACCEL. due to gravity = 9.8 meters/second^2 or 32 feet/second^2.

Example problem:

$\text{distance} = \frac{1}{2}(\text{acc.})(\text{time})^2$

$\text{distance} = \frac{1}{2}\left(\frac{9.8 \text{ met.}}{\text{sec}^2}\right)(1.2 \text{ sec})(1.2 \text{ sec})$

$d = \frac{1}{2}\left(\frac{9.8 \text{ m}}{\text{sec}^2}\right)(1.44 \text{ sec}) = \boxed{7.056 \text{ m}}$