Physics 12: 2D Kinematics

Solve Using Vector Diagrams.

1. A car has an initial velocity of 22m/s [37o N of W]. The car accelerates to a final velocity of 14m/s [72o N of W] in 6.0s.
2. Find the average velocity.
3. Find the displacement.
4. Find the change in velocity.
5. Find the acceleration.
6. A wombat named Lieutenant Saucy Gimbles goes for a run. Lieutenant Saucy Gimbles has an initial velocity of 0.97m/s [57o S of W] and then accelerates steadily at 0.49m/s2 [16o N of W] for 3.0s. Find Lieutenant Saucy Gimbles’s displacement over this time.
7. A pillow case filled with kidney beans and cottage cheese has an initial velocity of 10.25m/s [22.25o N of W]. The pillow case accelerates for 6.0s reaching a final velocity of 8.00m/s [74.0o N of E]. Find the acceleration and displacement.
8. What is the acceleration of a mass that has an initial velocity of 56km/h [36o W of S] and changes to 120km/h [16o N of E]in 33s?
9. A non-descript massive object, smelling faintly of Roquefort cheese and onion gravy, has an initial velocity of 42m/s [62o below –x]. The object has a constant acceleration of 2.65m/s2 [11o above –x]. The acceleration continues for 7.00s. What is the displacement of this object in those 7.00s?

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10. **DRAW A NEAT CLEAR DIAGRAM OF THE SITUATION BEFORE ATTEMTING TO SOLVE**

A car travels at constant speed of 42m/s around a circular track with a 250m radius.

* 1. How much time is required to travel 0.25 of the way around?
  2. If the car is travelling clockwise and starts at the 12:00 position find the change in velocity over this time.
  3. Find the displacement.
  4. Find the average velocity.
  5. Find the average speed.
  6. Find the average acceleration.
  7. Find the displacement as the car travels from 12:00 to 8:00.
  8. Find the average speed and average velocity for a full lap.

1. A speeding car, travelling south at 20.0m/s, passes a stationary police car. The police car immediately begins to accelerate at 5.00m/s2 in pursuit of the speeder.

a. How fast is the police car travelling when it catches up to the speeder?

b. How much time has elapsed?

c. How far have the cars travelled?

1. 4.6kg butter-nut squash is launched at 64o above horizontal from the top of a 11.6m tall building. The launch speed is 16.4m/s. The acceleration due to gravity is -9.80m/s2 .

a. What is the time in the air?

b. How far from the base of the building does the squash land?

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a. What is the time in the air?

b. How far from the base of the building does the squash land?