**Physics 30**

**Physics 20 Review**

**Kinematics**

1)

d = 1.0 m

v = 1.3 x 105 m/s

t = ?



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2)



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3)

v1 = 10 m/s

v2 = 30 m/s

t = 10 s

a = ?



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4)



v1 = 40 m/s

v2 = 0

t = 4.0 s

a = ?

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5)

v1 = 6.0 m/s

a = –2.0 m/s2

v2 = ?

a)



b)



c)



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6)

v1 = 0 m/s

v2 = 2.0 x 107 m/s

d = 0.10 m

t = ?

a = ?





7)

v1 = 500 m/s

v2 = 0

a = –9.81 m/s2

d = ?

t = ?

a)



b)



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8)

v1 = +9.0 m/s

d = –80 m

a = –9.81 m/s2

v2 = ?

t = ?

calculate the velocity just before it hits the ground



Now we can calculate the total time



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9)

v1 = 0 m/s

d = –20 m

a = –9.81 m/s2

v2 = ?

t = ?

calculate the velocity just before it hits the ground



calculate the time



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10)

v1 = +11 m/s

a = –9.81 m/s2

v2 = 0

d = ?

t = ?

calculate the time up



total time

t = 1.12 s x 2

t =2.2 s



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11)

v1 = +19.62 m/s

d = –117.82 m

a = –9.81 m/s2

v2 = ?

t = ?

calculate the velocity just before it hits the ground



calculate the total time



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12)

vertical



v1 = 0 m/s

d = –117.82 m

a = –9.81 m/s2

t = ?

horizontal



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**Vectors**



 m

h

1)



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2)





72 km

35 km



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3)



475 N

315 N



Note that the vectors add up to zero.



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4)

38

67.0 m/s

vy

vx



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5)





120 km/h

70 km/h



30o

Calculate the components of the wind vector and then add them to the airplane vector



120 km/h

60.6 km/h km/h



35.0 km/h km/h



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6)

45.0 N

30o

Calculate the components of each vector and then add them together.

Rx = 39.0 N east + 0

Rx =39.0 N east

Ry = 22.5 N north + 75 N north

Ry =97.5 N north



97.5 N

39.0 N



Ax = 45.0cos30

Ax = 39.0 N east

Ay = 45.0sin30

Ay = 22.5 N north



7)

Ay = 243sin50

Ay = 186.1 km north

243 km

50o

Bx = 57.0cos20

Bx = 53.6 km east

By = 57.0sin20

By = 19.5 km south

20o

Ax = 243cos30

Ax = 156.2 km east

57.0 km

Calculate the components of each vector and then add them together.

Rx = 156.2 km east + 53.6 km east

Rx =209.8 km east

Ry =186.1 km north + 19.5 km south

Ry =166.6 km north





209.8 km



166.6 km

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**Circular Motion**

1)

 

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2)



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3)



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**Dynamics**

1)

The car’s tires exert a force on the pavement directed backwards. Newton’s 3rd Law results in an opposite and equal reaction force of the pavement pushing the car forward. The car accelerating forward is a result of Newton’s 2nd Law where an unbalanced force results in an acceleration. When the car reaches the speed limit, the forward force balances the frictional forces which, according to Newton’s 1st Law, results in constant velocity.

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2)



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3)

 

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4)



5)

95.0 N

32o

Fnet= 80.56 N + (–50.0 N)

Fnet= 30.56 N

50.0 N

Ax = 95.0cos32

Ax = 80.56 N

Fg

FN



\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6)

68.0 N

constant speed → a = 0

a = 0 → Fnet = 0

∴Ff = 68 N

Ff

Fg

FN





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7)

Fg

FT



 



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21o

constant speed → a = 0

a = 0 → Fnet = 0

∴The forces acting on the helicopter (lift, weight, air resistance) add up to zero.

R

W = 5.38 x 104 N

L

8)

 

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9)

T

30o

Tx = Tcos30

In order for the tanker to go directly forward, T1 = T2



R

Tx

D

Tx