Newton laws worksheet 17

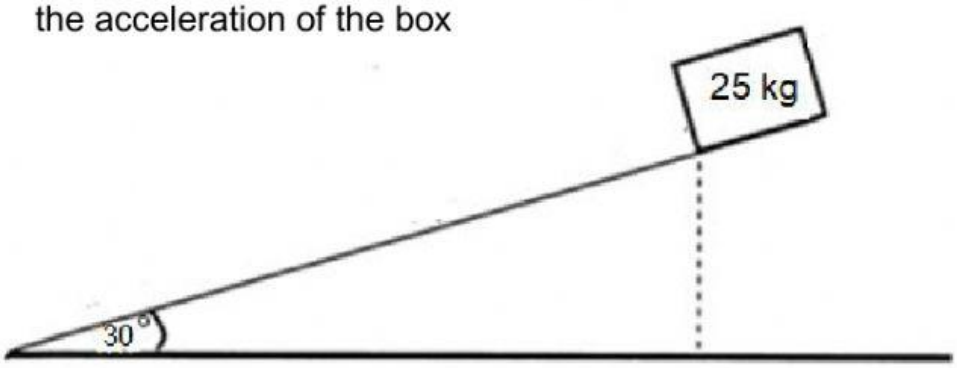
Eg 5. The coefficient of kinetic friction on the box is 0,14

Calculate

5.1 the friction on the box

5.2 the force of gravity acting parallel to the slope

5.3 the acceleration of the box



$f_k = \mu_k . F_N$

Thus we need the normal force

5.1 $F_N = F_{g\perp}$

$F_N = F_g . \cos \Theta$

$F_N = m.g.\cos\Theta$

$= 25(9,8).\cos 30$

$F_N = 212,176N$

$f_k = \mu_k . F_N$

$= 0,14\ (212,176)$

$= 29,70N$

5.2 $F_{g\parallel} = F_g . \sin\ominus$

$= m.g.\sin \ominus$

$= (25)(9,8).\sin 30$

$= 122,5\ N$

5.3 Fnet = m.a

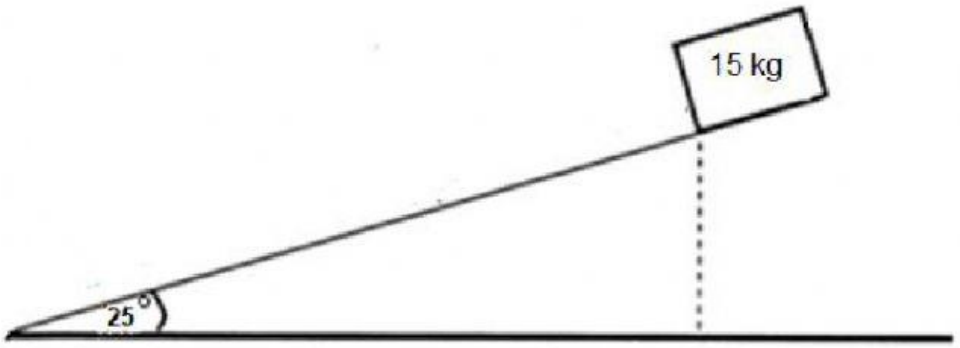
*The Fgll is bigger than the fk

Fgll – fk = 25.a

122,5 – 29,07 = 25.a

a = 3,74 $m.s^{-2}$ down the slope

6.



The coefficient of kinetic friction on the box is 0,21

Calculate the acceleration of the block

Step 1: find normal force

$f_k = \mu k.F_N$

Thus we need the normal force and the coefficient of friction

The normal force equals to Fg⊥ on a slope

$F_N = Fg\perp$

$F_N = Fg.\cos\Theta$

$F_N = m.g.\cos\Theta$

= 15(9,8).cos 25

= 133,23N

Step 2: find kinetic friction

$f_k = \mu k.F_N$

= 0,21(133,23)

= 27,98N

Step 3: Find Fgll

Fgll = Fg.sin$\ominus$

= m.g.sin $\ominus$

= (15)(9,8).sin 25

= 62,12 N

Step 4: Determine which force is bigger

Fgll > fk

Step 5: solve for the acceleration

Fnet = m.a

Fgll – fk = m.a

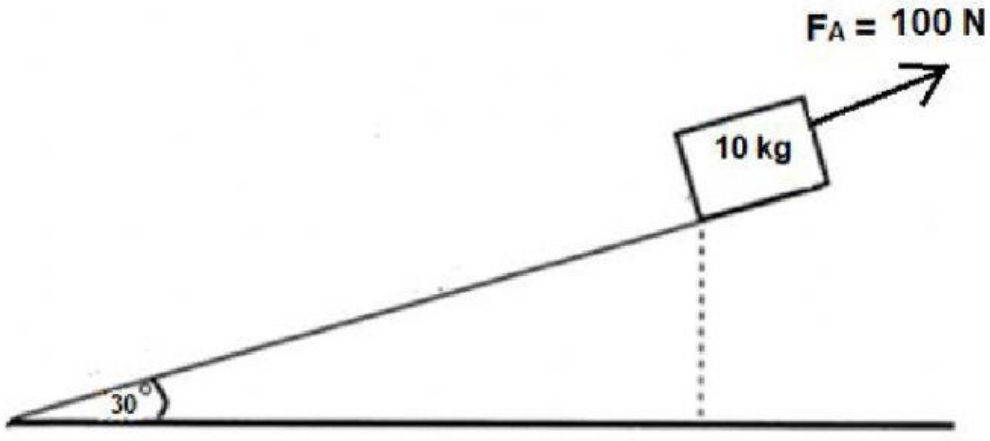
62,12 – 27,98 = 15.a

a = 2,28 m.s^{-2} down the slope

Exercise 16:

Calculate by following the steps above

1.



If the coefficient of kinetic friction is 0,3, calculate the acceleration of the block up the slope

Step 1: find normal force

$f_k = \mu k.F_N$

Thus we need the normal force and the coefficient of friction

$F_N = Fg\perp$

$= m.g.\cos\ominus$

= _____ {2 decimal places and leave no spaces between values and units}

Step 2: find kinetic friction

$f_k = \mu k.F_N$

= _____

Step 3: Find FgII

$Fg_{II} = Fg.\sin\ominus$

= _____

Step 4: Determine which force is bigger

Compare F_A and FgII only first

Which force is bigger: F_A or Fg

{we can't even look at friction until we decide this}

In what direction will the box move: up the slope down the slope

Then you can decide in which direction it moves

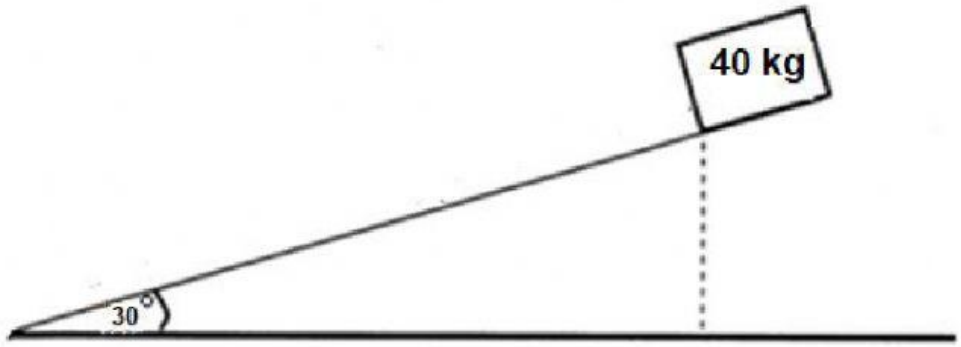
Step 5: solve for the acceleration

Fnet = m.a

$F_A - Fg_{II} - f_k = m.a$

a = _____ $m.s^{-2}$ up the slope

2. If the coefficient of kinetic friction is 0,3, calculate the acceleration of the block



Step 1: find normal force

$f_k = \mu k.F_N$

Thus we need the normal force and the coefficient of friction

$F_N = Fg\perp$

$F_N =$ _____

Step 2: find kinetic friction

$f_k = \mu k.F_N$

= _____

Step 3: Find FgII

$Fg_{II} = Fg.\sin\ominus$

= _____

Step 4: Determine which force is bigger

Which force is greater: fk FgII is greater

In what direction will the box move: up the slope down the slope

Step 5: solve for the acceleration

Fnet = m.a

Fgll – fk = m.a

a =_____$m.s^{-2}$ down the slope

Exercise from booklet

Refer to the electronic copy of the physics booklet that was emailed to you

Pg 80 Q4

Pg 83 Q2

Pg 87 Q2

Pg 93 Q4