Introduction to Newtonian Dynamics

1. For each of the following the object is in equilibrium ($\rightharpoonaccent{a}$=0). Find the unknown forces. Diagrams are not drawn to scale.

 16N 6N 115N F2

 F1 83N

 11N F3

 1N

 1.8N

 F4 99N

 77N

 41N

 74N F5

 26N 48N

 F6

 111N

 F7

 22N

 900N 1400N

 F8

 75N 200N 9N

 9N

 F9

 3.0N 3N

 4.0N F10 15N

 F11

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **F1** | **F2** | **F3** | **F4** | **F5** | **F6** | **F7** | **F8** | **F9** | **F10** | **F11** |
|  |  |  |  |  |  |  |  |  |  |  |

2. Find the **net force** ( $∑\rightharpoonaccent{F} $) on each of the following. Be sure to state the direction!

a. b.

5N 14N 80N

 140N

c.

 24N 18N d.

 12N 32N 21N

 47N

 36N

 5100N

e. 3600N f.

 40N

 2900N

 15N

 7.0N 30N

26o

51o

g.

3. For each of the following objects the mass is 2.0kg. Find the acceleration.

a. b.

8N 21N 0.60N

 1.0N

c.

 7N 5N d.

 4N 120N 96N

 160N

 140N

 5100N

e. 3600N f.

 2N

 8700N

 1.5N

 15N

 7.0N

26o

51o

g.

4. For each of the following find the missing force.

a. $∑\rightharpoonaccent{F}$=2N left b. $∑\rightharpoonaccent{F}$=32N right

 16N 6N 115N F2

 F1 83N

 11N F3

c. $∑\rightharpoonaccent{F}$=9N down d. $∑\rightharpoonaccent{F}$= 0.70N [21o below –x]

 2.0N

 3.5N

 21o

 F4

 41N 6.2N

 5.4N

e. $∑\rightharpoonaccent{F}$=12N **x** f. $∑\rightharpoonaccent{F}$= -1.4 N **y**

 74N F5

 26N 48N

 F6

 6.6N

5. For each of the following find the missing force(s). Assume the mass is 5.0kg.

a. $\rightharpoonaccent{a}$= 0.40m/s2 right b. $\rightharpoonaccent{a}$=2.0m/s2 up 30.0N

 7.0N

 F2 16N

8.0N

 F1

 F3

 7.0N

c. $\rightharpoonaccent{a}$=-12m/s2 $\hat{x}$ d. $\rightharpoonaccent{a}$= 4.0m/s2 $\hat{y}$F5

 80.0N 120N

 F4

 12N

6. For the following assume the object is in equilibrium. State the magnitude ***and direction*** of the missing force(s).

 F1 F2

 2.0N

 4.0N

 2.0N 6.0N

 3.0N

 5.0N

 F3

 76N 88N

  33o36N

 F4 51o

F6

 84N

F7

 F5

36o

22N

42o

66o

F6

F7

71o

410N

7. Find the SINGLE missing force and draw it in place.

a. $\rightharpoonaccent{a}$= 5.0m/s2 right b. $\rightharpoonaccent{a}$=1.2m/s2 up

 120N

12kg

2.0kg

 13N

c.$\rightharpoonaccent{ a}$= 2.0m/s2 left

 11N d. $\rightharpoonaccent{a}$= 1.8m/s2 [68o above –x]

4.0kg

 48N

 7N

 62o

2.0kg

 27o

 71N