Introduction to Newtonian Dynamics

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

16N 6N 115N 198N

10N83N

11N 30N

1N

1.8N

2.8N99N

77N

41N

74N 52N

26N 48N

65N

111N

275N

22N

900N 1400N

500N

75N 200N 9N

9N

12N 3N

15N

16N

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

a. b.

5N 14N 80N

140N

∑**F**=9N right ∑**F**=60N left

c.

24N 18N d.

12N 32N 21N

47N

36N

∑**F**=6N right ∑**F**=0N

5100N

e. 3600N f.

40N

2900N

∑**F**=5800N up 30N

∑**F**=50N [37o below +x]

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

a. b.

8N 21N 0.60N

1.0N

**a**=6.5m/s2 right **a**=0.20m/s2 left

c.

7N 5N d.

4N 120N 96N

160N

**a**=1.0m/s2 right 140N

5100N **a**= - 2.0m/s2 **x**

e. 3600N f.

2.00N

8700N

1.50N

**a**=0m/s2 **a**=1.25m/s2 [37o below +x]

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

a. ∑**F**=2N left b. ∑**F**=32N right

16N 6N 115N 230N

8N83N

11N 21N

c. ∑**F**=9N down d. ∑**F**= 0.70N [21o below –x]

2.0N

3.5N

21o

6.2N

41N 6.2N

5.4N

e. ∑**F**=12N **x** f. ∑**F**= -1.4 N **y**

74N 64N

26N 48N

6.4N

6.6N

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

a. **a**= 0.40m/s2 right b. **a**=2.0m/s2 up 30.0N

7.0N

16N16N

8.0N

10N 20.0N

7.0N

c. **a**=-12m/s2 **x** d. **a**=4.0m/s2 **y** 32N

80.0N 120N

100N 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

84N

F5

**F1**=5.0N [37o above –x]

**F2**=5.0N [37o above –x]

**F3**= 77N [34o above +x]

**F4**= 55N left

**F5**=1.0x102N down

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

a. **a**= 5.0m/s2 right b. **a**=1.20m/s2 up

15.4N

120N

12kg

6.0x10N

2.00kg

13.0N

c. **a**= 2.0m/s2 left

20N [20o above –x]

d. **a**= 1.8m/s2 [68o above –x]

11N

4.0kg

48N

7N 62o

2.0kg

27o

87N [4.5o below –x] 71N