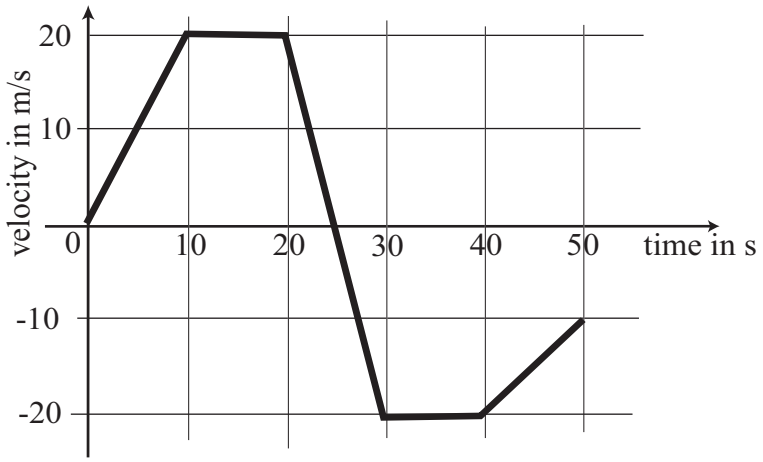
Physics 101 (S11) **Q2A**

Name: _____ **Section:** _____ **Score:** _____/20

1. A box of mass $M = 13$ kg is moving along the x-axis. Its velocity is approximately described in the following graph.



(a) What is the largest (in magnitude) force acting on the box before 50 s? [5]

(b) What is the mean velocity of the box between $t = 0$ and $t = 30$ s? [5]

(**2** on the next page)

2. From the top of a tower of height h a ball is thrown vertically upward with an initial velocity v_0. The ball reaches its highest point after 1 s, and falls to the ground after 4 s (i.e., 3 s after reaching the highest point).

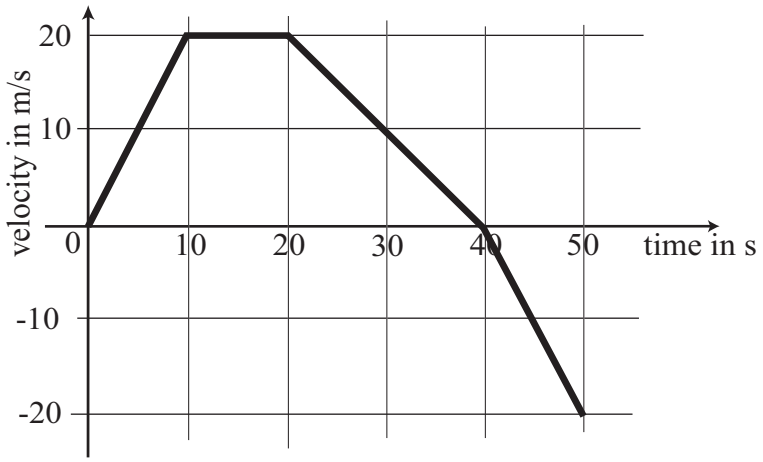
(a) What is the initial velocity v_0? [5]

(b) What is the height h of the tower? [5]

Physics 101 (S11) **Q2B**

Name: _____ **Section:** _____ **Score:** _____/20

1. A box of mass $M = 7$ kg is moving along the x-axis. Its velocity is approximately described in the following graph.



(a) What is the magnitude of the force acting on the box at $t = 30$ s? [5]

(b) What is the displacement of the box from $t = 0$ to $t = 50$ s? [5]

(**2** on the next page)

2. A toy rocket is launched vertically at $t = 0$, and exhausts its fuel at $t = 2$, but keeps going up vertically. It reaches its highest point at $t = 3.5$ s. Then, it falls to the ground at $t = 6$ s.

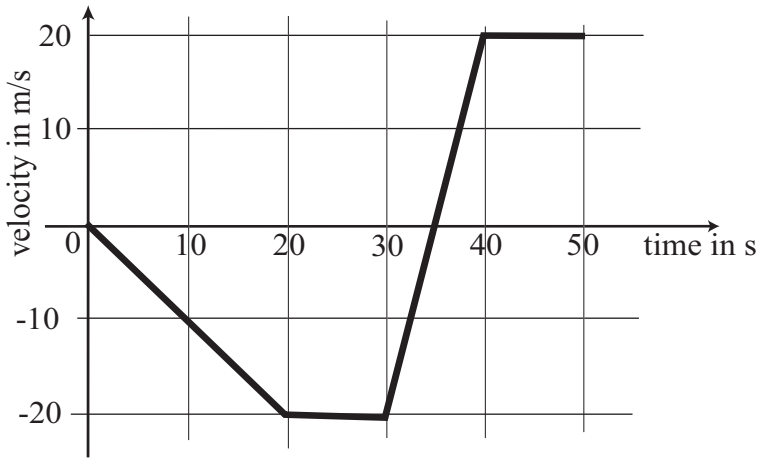
(a) What is the velocity v_0 of the rocket just after the fuel is exhausted at $t = 2$ s? [5]

(b) What is the height H of the highest point the rocket reaches? [5]

Physics 101 (S11) **Q2C**

Name: _____ **Section:** _____ **Score:** _____**/20**

1. A box of mass $M = 11$ kg is moving along the x-axis. Its velocity is approximately described in the following graph.



(a) What is the maximum force acting on the box between $t = 0$ and $t = 50$ s? [5]

(b) At $t = 0$ the box is at the location $x = 350$ m. What is its x-coordinate at $t = 50$ s? [5]

(**2** on the next page)

2 From the top of a tower of height h a ball is thrown vertically upward with an initial velocity v_0. The ball reaches its highest point after 1.2 s. The speed of the ball when it reaches the ground is 29 m/s.

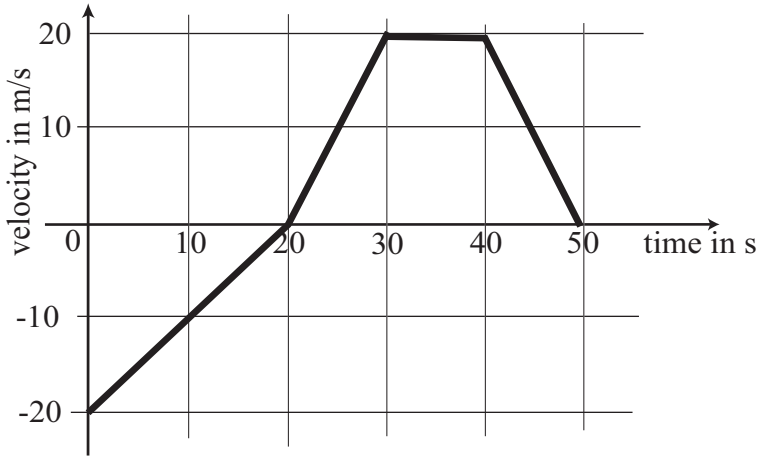
(a) What is the initial velocity v_0? [5]

(b) What is the height h of the tower? [5]

Physics 101 (S11) **Q2D**

Name: _____ **Section:** _____ **Score:** _____/20

1. A box of mass $M = 19$ kg is moving along the x-axis. Its velocity is approximately described in the following graph.



(a) What is the force acting on the box at $t = 35$ s? [5]

(b) At $t = 0$ the box is at the location $x = 0$ m. At what time t does the box return to the origin before $t = 50$ s? [5]

(**2** on the next page)

2. A box of mass M is moving on a horizontal frictionless surface at a speed $v_0 = 7$ m/s. At $t = 0$, it goes into a rough patch of width $L = 2.5$ m, on which the acceleration in the x direction of the box is -11 m/s^2.

(a) What is the displacement of the box between $t = 0$ and $t = 1/2$ s? [5]

(b) Can the box cross the rough patch (or does it stop inside the rough patch)? You must justify your answer. [5]