1. Solve for x: $\dfrac{x}{3} + \dfrac{x}{a} = \dfrac{8}{b}$

   (a) $\dfrac{b}{8(3+a)}$
   (b) $\dfrac{b(3+a)}{8}$
   (c) $\dfrac{8(3+a)}{b}$
   (d) $\dfrac{24a}{b(3+a)}$
   (e) $\dfrac{24a}{b}$

2. Solve for x: $U = \frac{1}{2}k(x - x_\circ)^2$

   (a) $\dfrac{2U}{k} + x_\circ$
   (b) $\sqrt{\dfrac{2U}{k}} + x_\circ$
   (c) $\dfrac{2U}{k} - x_\circ$
   (d) $\sqrt{\dfrac{2U}{k}} - x_\circ$
   (e) $\sqrt{\dfrac{2U}{k} + x_\circ}$

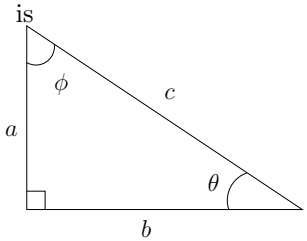
3. If $x + 2y = 10$ and $x - 2y = -2$, then

   (a) There is insufficient information to solve the system of equations
   (b) There is no solution that satisfies the above system of equations
   (c) $x = 4, y = 2$
   (d) $x = 3, y = 4$
   (e) $x = 4, y = 3$

4. Which of the following is another way of saying $(x-7)^2$?

   (a) $x^2 - 14x + 49$
   (b) $x^2 + 14x - 49$
   (c) $x^2 + 14x + 49$
   (d) $x^2 + 49$
   (e) $x^2 - 49$

5. In the right-angled triangle shown, the "hypoteneuse" is



   (a) ϕ
   (b) b
   (c) c
   (d) θ
   (e) a

6. One "cubic metre" (m^3) has

   (a) 100 cm^3
   (b) 1 000 cm^3
   (c) 10 000 cm^3
   (d) 100 000 cm^3
   (e) 1 000 000 cm^3

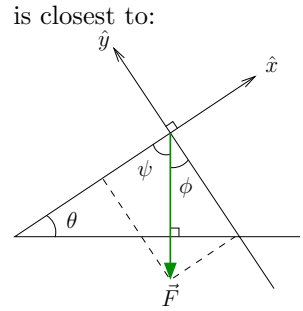
7. $\dfrac{7}{5} + \dfrac{2}{5}$ is equal to

   (a) 10/14
   (b) 9/5
   (c) 9/25
   (d) 35/10
   (e) 14/25

8. Evaluate the following derivative at $x = 2$: $\frac{d}{dx}\left(x^3 - 5x\right)$

   (a) -2
   (b) 2
   (c) 3
   (d) 7
   (e) 12

9. In the diagram below, $\theta = 30°$ and the vector $\vec{F}$ is 15.0 units long. Given that $\cos 30° = \sqrt{3}/2 \approx 0.866$ and $\sin 30° = 1/2$, the component of $\vec{F}$ parallel to the $\hat{y}$ axis is closest to:



   (a) 0 units long
   (b) 7.5 units long
   (c) 8.7 units long
   (d) 13.0 units long
   (e) 15.0 units long

10. Solve for R: $\dfrac{Q_2}{(d-R)^2} = \dfrac{Q_1}{R^2}$

   (a) $\dfrac{dQ_1 \pm d\sqrt{Q_1Q_2}}{Q_1 - Q_2}$
   (b) $\dfrac{-2dQ_1 \mp 2\sqrt{d^2Q_1^2 + (Q_1 - Q_2)Q_1d^2}}{-(Q_1 + Q_2)}$
   (c) $\dfrac{-dQ_1 \pm d\sqrt{Q_1Q_2}}{Q_1 - Q_2}$
   (d) $\dfrac{-2dQ_1 \pm \sqrt{4dQ_1^2 + 4(Q_1 - Q_2)Q_1d^2}}{Q_2 - Q_1}$
   (e) $\dfrac{-2dQ_1 \pm \sqrt{4dQ_1^2 - 4(Q_1 - Q_2)Q_1d^2}}{Q_2 - Q_1}$