

$$mgh_1 - \frac{1}{2}mv_1^2 = mgh_2 + \frac{1}{2}mv_2^2$$



$$PE_1 + KE_1 = PE_2 + KE_2$$

$$mgh_1 + \frac{1}{2}mv_1^2 = mgh_2 + \frac{1}{2}mv_2^2$$

$$v_2 = \sqrt{2gh}$$



$$v_F = ?$$

$$W_F = \Delta KE = KE_2 = PE_1 = mgh$$

$$W_F = (10.5 \text{ kg})(9.8 \text{ m/s}^2)(15 \text{ m})$$

$$W_F = 1.5 \text{ kJ}$$

6

$$d = 10 \text{ m}$$

$$h = ?$$

$$PE_1 = mgh \Rightarrow h = \frac{PE_1}{mg}$$

$$h = \frac{2570 \text{ J}}{(10.5 \text{ kg})(9.8 \text{ m/s}^2)}$$

$$h = 25 \text{ m}$$

$$PE_1 = KE_2$$

$$KE_2 = W_F$$

$$W_F = F \cdot d$$

$$W_F = 257 \text{ N} \cdot 10 \text{ m}$$

$$W_F = 2570 \text{ J} = KE_2 = PE_1$$

$$F_F = \frac{W_F}{d} = \frac{1.5 \text{ kJ}}{6 \text{ m}}$$

$$F_F = 257 \text{ N}$$

4



$$m = 6 \text{ g} = 0.006 \text{ kg}$$

$$F = 1.2 \times 10^{-9} \text{ N} = 0.012 \text{ N}$$

$$d = 3 \text{ cm} = 0.03 \text{ m}$$

$$a) W = F \cdot d = 3.6 \times 10^{-4} \text{ J}$$

$$b) \Delta KE = W = 3.6 \times 10^{-4} \text{ J}$$

$$c) v = ? \quad KE = \frac{1}{2}mv^2 \Rightarrow v = \sqrt{\frac{2KE}{m}} = 0.15 \text{ m/s}$$

5



$$m_1 = 50.0 \times 10^3 \text{ kg} = 50,000 \text{ kg}$$

$$v_1 = 18 \text{ km/h} = 5 \text{ m/s}$$

$$m_2 = 15.0 \times 10^3 \text{ kg} = 15,000 \text{ kg}$$

$$\Delta P_1 = \Delta P_F$$

$$m_1 v_1 + m_2 v_2 = (m_1 + m_2) v_F$$

$$v_F = \frac{m_1 v_1}{m_1 + m_2} = 3.8 \text{ m/s}$$

6

$$\Delta KE = KE_F - KE_i$$

$$= \frac{1}{2}(m_1 + m_2)v_F^2 - \left(\frac{1}{2}m_1 v_1^2 + \frac{1}{2}m_2 v_2^2 \right)$$

$$= -1.6 \times 10^5 \text{ J}$$

SCIENCE 218
STUDENT INFORMATION

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Home Address (Number, Street, City, Zip Code) _____

Home Phone Number: _____

Parents or Guardians: First and Last Names, including titles (Mr., Mrs., Miss, Ms., Dr.) _____

Father/Guardian: _____

Mother/Guardian: _____

SCHEDULE

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1						
2						
3						
4						
5						
6						
7						
8						
9						

PERIOD

ON THE BACK OF THIS PAPER, PLEASE DESCRIBE HOW YOU STUDY FOR A TEST. (DO YOU READ THE NOTES, LOOK OVER WORKSHEETS, ETC.)

⑥



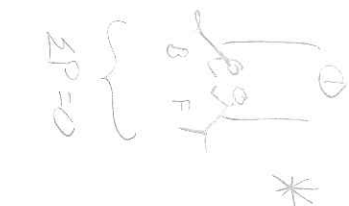
$v = 450 \text{ kg}$

$PE_A = mgh_A = 2.1 \times 10^5 \text{ J}$

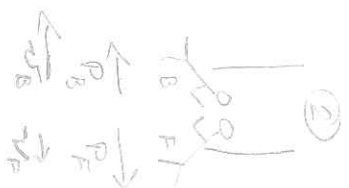
$PE_B = mgh_B = 0$

$PE_C = mgh_C = 1.0 \times 10^5 \text{ J}$

⑦



$h_F = ?$



$\leftarrow v_B \quad \rightarrow v_F$

②

③



$m_B = 90.0 \text{ kg}$
 $m_F = 140 \text{ kg}$
 $h_B = 1.20 \text{ m}$
 $h_F = ?$

$PE_F = m_F g \cdot h_F \Rightarrow h_F = \frac{PE_F}{m_F g}$

$PE_{F3} = KE_{F2} = \frac{1}{2} m_F v_F^2 = \frac{1}{2} (140 \text{ kg}) (3.1 \text{ m/s})^2 = 678 \text{ J} = PE_{F3}$

$m_F v_F = m_B v_B \Rightarrow v_F = \frac{m_B v_B}{m_F} = \frac{90 \text{ kg} (4.8 \text{ m/s})}{140 \text{ kg}} = 3.1 \text{ m/s} = v_F$

$v_B = ? \quad KE_{B2} = \frac{1}{2} m_B v_B^2 \Rightarrow v_B = \sqrt{\frac{2 KE_{B2}}{m_B}} = \sqrt{\frac{2 m_B g h_B}{m_B}} = \sqrt{2 g h_B} = 4.8 \text{ m/s}$

$KE_{B2} = PE_{B3} = m_B g \cdot h_B \rightarrow$

$h_F = 0.49 \text{ m}$

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SCHEDULE

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1						
2						
3						
4						
5						
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7						
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PERIOD

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