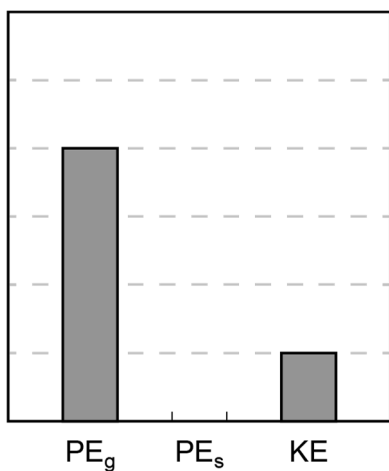


**Rating Guide**  
**Physics Bungee Jumping Cluster-25**

- 1 [1] Allow 1 credit for 4.
- 2 [1] Allow 1 credit for 2.
- 3 [1] Allow 1 credit for drawing a bar that is one graph grid in height above the  $KE$  label.

**Example of a 1-credit response:**



**Note:** No credit given for any response with energy above the  $PE_s$  labels.

- 4 [1] Allow 1 credit for an acceptable response. Acceptable responses include, but are not limited to:

$$(PE_g + PE_s + KE)_1 = (PE_g + PE_s + KE)_2$$

*or*

$$mgh_1 = mgh_2 + PE_{s2}$$

*or*

$$PE_s = -\Delta PE_g$$

*or*

$$(60)(9.81)(200) = PE_s$$

- 5 [1] Allow 1 credit for 2.

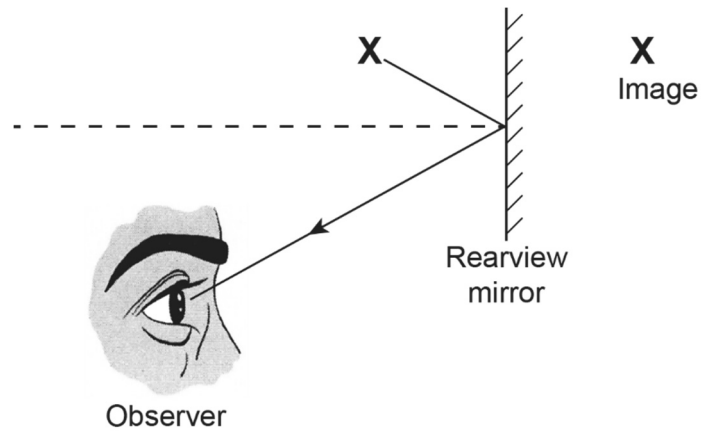
**Item Alignment**  
**Physics – Bungee Jumping**

Item Number	Performance Expectation
1	HS-PS3-1
2	HS-PS2-1
3	HS-PS3-2
4	HS-PS3-1
5	HS-PS3-2

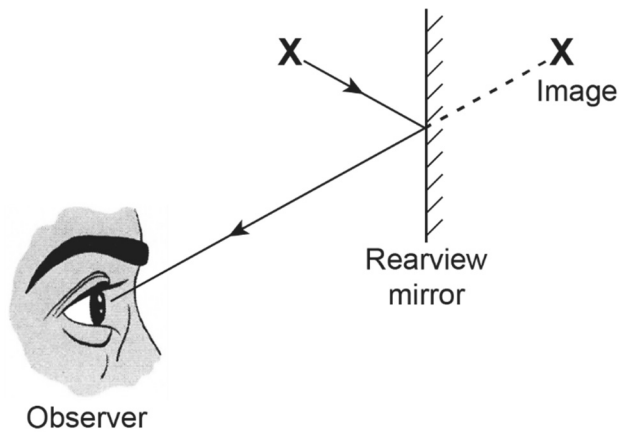
**Rating Guide**  
**Physics Automotive Optics Cluster-25**

- 1 [1] Allow 1 credit for 1.
  
- 2 [1] Allow 1 credit for a  $29^\circ \pm 2^\circ$  angle drawn from the normal or a  $61^\circ \pm 2^\circ$  angle drawn from the mirror's surface *and* an indicated object that is located on the path of the incident ray in front of the mirror *and* has the same distance to the mirror as the image,  $\pm 0.2\text{cm}$ .

**Examples of 1-credit responses:**

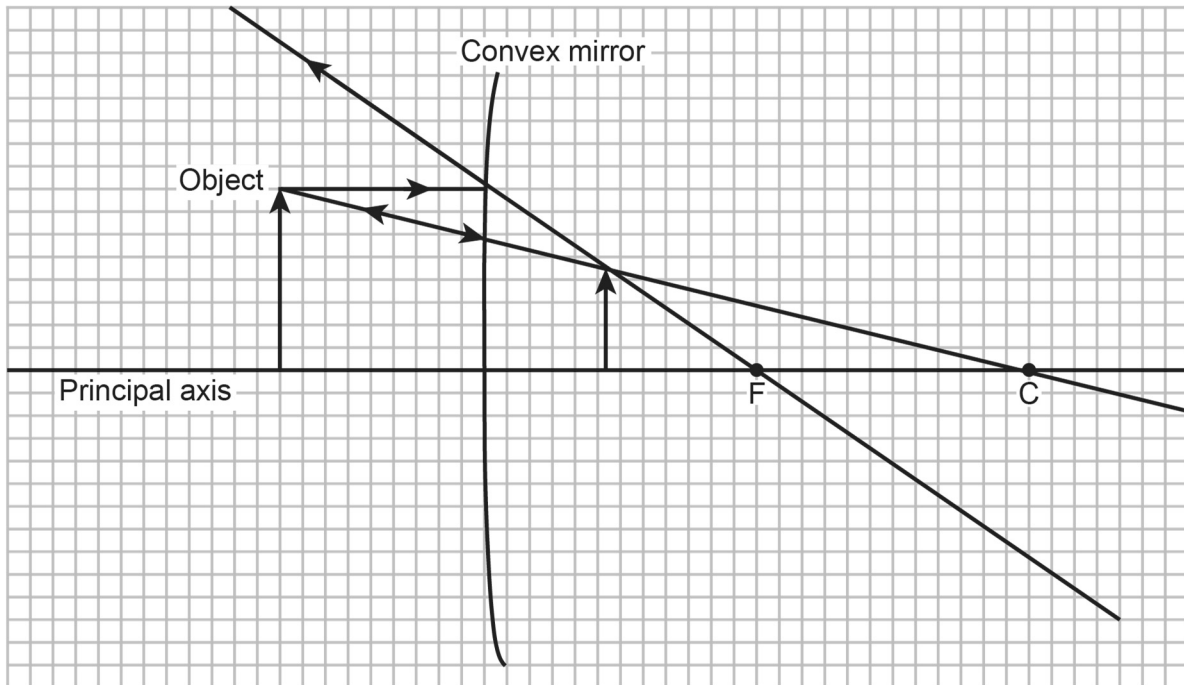


*or*

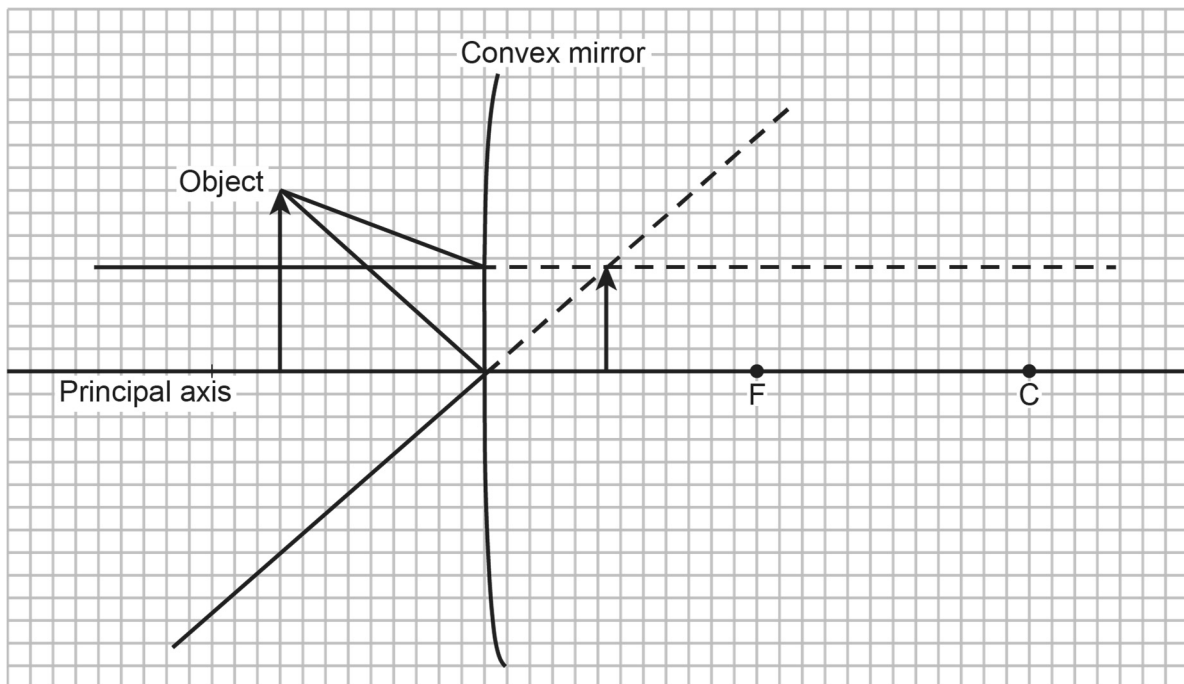


- 3 [1] Allow 1 credit for a correctly completed ray diagram resulting in an upright, virtual image that is smaller than the object and located between the mirror and the focal point. In order to receive credit, students must have correctly drawn the paths of *at least two* rays to determine the size, location, and orientation of the image.

**Examples of 1-credit responses:**



or



4 [1] Allow 1 credit for 3.

5 [1] Allow 1 credit for 3.

**Item Alignment**  
**Physics – Automotive Optics**

Item Number	Performance Expectation
1	HS-PS3-3
2	HS-PS4-6
3	HS-PS4-6
4	HS-PS4-6
5	HS-ETS1-3

**Rating Guide**  
**Physics World Record Jumps - Cluster-25**

- 1 [1] Allow 1 credit for indicating Refute *and* one or more correct mathematical relationships resulting in approximately 148 N.

**Examples of a 1-credit response:**

$$a = \frac{\Delta v}{t} = \frac{11.8 \text{ m/s} - 0 \text{ m/s}}{6.36 \text{ s}} = 1.86 \text{ m/s}^2 \quad \text{or} \quad F_{net} = (79.4)(1.855) = 147.3$$

$$F_{net} = ma = (79.4 \text{ kg})(1.86 \text{ m/s}^2) = 148 \text{ N}$$

- 2 [1] Allow 1 credit for 3.
- 3 [1] Allow 1 credit for 2.
- 4 [1] Allow 1 credit for 4.
- 5 [1] Allow 1 credit for indicating a smaller force *and* a greater time.

**Item Alignment**  
**Physics – World Record Jumps**

Item Number	Performance Expectation
1	HS-PS2-1
2	HS-PS2-1
3	HS-PS2-1
4	HS-PS2-1
5	HS-PS2-3