

## Section 1: Calculator Inactive

For questions 1-3, find the standard form for the following conic sections:

(1) Parabola: Opens Up, Vertex (1, -7), x-intercept of (4, 0)	(2) Hyperbola: Vertices (2, 0) & (-2, 0), Asymptotes: $y = \pm \frac{5}{2}x$	(3) Ellipse: Minor Vertices (0, 6) & (0, -6), Foci (4, 0) & (-4, 0)
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For questions 4-7, use the space below to write the following equations in standard form & to find the intercepts. Then identify all of the pieces for each equation and graph on the templates provided.

(4) $y^2 - 4y + 6x + 10 = 0$	(5) $-4x^2 + 8x + 6y^2 + 48y + 56 = 0$
(6) $4x^2 + 16x + y^2 + 6y = -9$	(7) $3x^2 + 3y^2 - 12x = 0$

(8) In a factory, a parabolic mirror is used as a spotlight on the work floor. It measures 4 feet deep and 5 feet wide. If the bulb is to be placed at the mirror's focus, how far from the base of the mirror should the bulb be placed?

(9) Kelly wants to construct an ellipse with a length of 20 inches and a width of 8 inches. Knowing that an ellipse is constructed from the foci, how far apart should she place the foci from one another?

(10) Vector  $\mathbf{v}$  has an initial point at  $(-2,3)$  and a terminal point at  $(6,1)$ .

(a) Write the vector  $\mathbf{v}$  in component form.

(b) Determine the magnitude of  $\mathbf{v}$ .

(c) Find a vector that goes in the same direction as  $\mathbf{v}$ , but has a magnitude of 3.

(11) Vector  $\mathbf{w}$  has an initial point at  $(4,3)$  and a terminal point at  $(-1,-1)$ .

(a) Write the vector  $\mathbf{w}$  in component form.

(b) Determine the magnitude of  $\mathbf{w}$ .

(c) Find a vector that goes in the same direction as  $\mathbf{w}$ , but has a magnitude of 4.

Section 2: Calculator Active - Round all answers to the nearest tenth.

(12)  $\mathbf{v} = 2\mathbf{i} + 6\mathbf{j}$     $\mathbf{u} = -4\mathbf{i} + 3\mathbf{j}$     $\mathbf{w} = \mathbf{i} - 5\mathbf{j}$

(a) $2\mathbf{v} + \mathbf{w}$	(b) $\mathbf{u} - \mathbf{v}$	(c) Find $\mathbf{v} \cdot \mathbf{u}$ and $\mathbf{u} \cdot \mathbf{w}$
(d) Find the angle between $\mathbf{v}$ & $\mathbf{u}$	(e) Find the angle between $\mathbf{v}$ & $\mathbf{w}$	(f) Find the angle between $\mathbf{u}$ & $\mathbf{w}$

(13) A baseball is hit at an angle of  $26^\circ$  with a force of 12 feet per second. Find the horizontal and vertical force of the ball at the moment of impact.

(14) A skate board is moving down a hill with a horizontal force of 300 meters per minute and a vertical force of -120 meters per minute. Find the speed and the direction angle of the skate board.

Speed:
Direction Angle:

(15) A plane is flying at a bearing of  $S28^\circ W$  at a speed of 422 mph. At a certain point, the plane hits a wind that is gusting at 62 mph heading in a direction  $N60^\circ E$ . Find the resulting speed, direction, and bearing of the plane at this given point.

Speed:
Direction Angle:
Bearing:

(16) A windjammer travels at a bearing of  $N42^\circ W$  for 16 miles. Then the windjammer alters its course to travel due west for 22 miles. How far is the windjammer from its original location and what is the bearing from the windjammer's original location to the current location?

Distance:
Direction Angle:
Bearing:

(17) A plane is flying at a bearing of  $N42^\circ W$  at a speed of 405 mph. A wind is blowing at 51 mph in a direction  $S42^\circ E$ . Find the resulting speed, direction, and bearing of the plane at this given point.

Speed:
Direction Angle:
Bearing:

(18) A plane is flying at a bearing of  $S42^\circ E$  for 103 miles. Then it changes course and flies  $S68^\circ E$  for 88 miles. Find the resulting distance, direction, and bearing of the plane at this given point.

Distance:
Direction Angle:
Bearing: