

**Answers are at the end of the test**

1. Describe the parabola  $y = 7x^2$  using the parabola  $y = x^2$  as a comparison. Describe the steps, vertex and the axis of symmetry.
2. If the parabola  $y = x^2$  is compressed to  $\frac{1}{4}$  of its original size and reflected in the x-axis what would be its equation?
3. Write the equation of the parabola congruent to  $y = 2x^2$  that has been shifted 5 units to right and down 3 units.
4. Write the equation of the parabola congruent to  $y = 5x^2$  that has been shifted 7 units up and 3 units to the left.
5. Determine the equation of the parabola that is obtained by taking the parabola  $y = x^2$  stretching it vertically by a factor of 6, reflecting it in the x-axis, shifting it left 4 units and down 5 units.
6. List the transformations done to  $y = x^2$  to obtain  $y = -\frac{1}{2}(x-4)^2 + 6$ . Sketch the image and pre-image curves.
7. Determine the vertex of the parabola  $y = -3(x-2)(x-12)^2$  using symmetry.
8. Convert  $y = 2x^2 - 11x + 5$  to factored form  $y = a(x-r)(x-s)$ . Locate the x-intercepts and the vertex.
9. Determine the vertex of the parabola  $y = x^2 - 4x + 9$  after completing the square.
10. Determine the vertex of the parabola  $y = -3x^2 + 24x - 1$  after completing the square.
11. Determine the key points (vertex, x-intercepts, y-intercept) and the equation of the axis of symmetry for  $y = 2(x-3)^2 - 8$ . Graph showing the key points.
12. Graph  $y = -\frac{1}{2}(x+2)^2 + 2$  using key points. Include at least 5 points in your graph.

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13. A parabola has vertex at (3, 5) and passes through (4, 9). Determine its equation in vertex and standard form.
14. A parabola is congruent to  $y = 2x^2$  and passes through (-2, -2) and (-5, 4). Determine its equation in vertex and standard form.
15. The height of a ball thrown up in the air is given as  $h = -4.9t^2 + 29.4t + 1$ . Determine the maximum height reached by the ball and how long it took to get there. ( $h$  is in metres and  $t$  in seconds)
16. The cost in \$ to run an electrical appliance is given by  $C = 2t^2 - 24t + 145$ , where  $t$  = the time in months the appliance is running. What is the minimum cost of running the appliance?
17. A farmer has 600m of rope to fence off a rectangular field. He is fencing off 3 sides. The 4<sup>th</sup> side is along a river and requires no fence along that side. Determine the dimensions that give the maximum area.
18. Two numbers have a sum of 4. Determine the numbers if the sum of their squares is to be a minimum.

Answers

1. steps 7, 21, 35, Vertex (0,0), axis  $x = 0$
2.  $y = -\frac{1}{4}x^2$
3.  $y = 2(x-5)^2 - 3$
4.  $y = 5(x+3)^2 + 7$
5.  $y = -6(x+4)^2 - 5$
6. vert stretch by 0.5, refl in x-axis, 4 rt 6 up
7. vertex at (7,75)
8.  $x$ -int 0.5, 5 vertex  $\left(\frac{11}{4}, -\frac{81}{8}\right)$
9. (2,5)
10. (-4,49)
11. V (3,-8),  $x$ -int -1, 7  $y$ -int 10 axis  $x = 3$
12. V (-2,2),  $x$ -int 0, 4  $y$ -int 0
13.  $y = 4(x-3)^2 + 5$   $y = 4x^2 - 24x + 41$
14.  $y = 2(x+3)^2 - 4$   $y = 2x^2 + 12x + 14$
15. 45.1m, 3s
16. \$73 after 6 months
17. 150m by 450m
18. 2 and 2