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**Graphing Quadratics**

Age 13-15

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**Question**

Find the turning point and line of symmetry for these two parabolas.

<EFOFEX>
id:fxd{b0df3fdd-711f-4466-bfc3-b8b145766594}
FXGP:DP-9xFw7yT
FXData:

</EFOFEX>

**Solution**

<EFOFEX>
id:fxe{7ab2459b-750c-4567-8277-8c80fe6908f4}
FXGP:DP-9xFw7yT
FXData:

</EFOFEX>

**Notes**

2000+ variations.

**Question**

Graph the following quadratic function on this set of axes.

<EFOFEX>
id:fxe{6be1242f-4e96-49d6-ada3-a2225d51edc2}
FXGP:DP-ujW7kd3
FXData:

</EFOFEX>

<EFOFEX>
id:fxd{47548b70-a020-4399-a85f-1b34e49cfff1}
FXGP:DP-nCmnQte
FXData:

</EFOFEX>

**Solution**

<EFOFEX>
id:fxd{1cf0381a-1a08-427e-bbac-fbd3c33b2ffe}
FXGP:DP-ujW7kd3
FXData:

</EFOFEX>

**Notes**

18 variations.

**Question**

Graph the following quadratic function on this set of axes. State the coordinates of the turning point.

<EFOFEX>
id:fxe{6c287118-faf6-4ba0-a453-4e822aa401eb}
FXGP:DP-wqdHc9x
FXData:

</EFOFEX>

<EFOFEX>
id:fxd{af703ea2-3995-4fb5-840f-2448050e7495}

FXData:

</EFOFEX>

**Solution**

<EFOFEX>
id:fxd{86f2a294-1ede-4fcd-a3c4-46953f60e54f}
FXGP:DP-wqdHc9x
FXData:

</EFOFEX>

**Notes**

180 variations.

**Question**

Graph the following quadratic function on this set of axes. State the coordinates of the turning point.

<EFOFEX>
id:fxe{2e94879e-97ba-4830-9283-79d52365a356}
FXGP:DP-QbKGbd4
FXData:

</EFOFEX>

<EFOFEX>
id:fxd{dff48871-ccb0-4759-a52b-5b9f3ea9b9f1}

FXData:

</EFOFEX>

**Solution**

<EFOFEX>
id:fxd{a8b505e7-86e2-4317-ba54-3c0af0bc7ab0}
FXGP:DP-QbKGbd4
FXData:

</EFOFEX>

**Notes**

360 variations.

**Question**

Graph the following quadratic function on this set of axes. State the coordinates of the turning point.

<EFOFEX>
id:fxe{6999b518-9e2e-4132-a8f9-436cf1b0b186}
FXGP:DP-vxcXep6
FXData:

</EFOFEX>

<EFOFEX>
id:fxd{d3e95b43-0ca2-4fe6-97f6-db94b9198850}

FXData:

</EFOFEX>

**Solution**

<EFOFEX>
id:fxd{5d7fd116-dc4d-43af-bf23-658a3fa8e11c}
FXGP:DP-vxcXep6
FXData:

</EFOFEX>

**Notes**

180 variations.**Question**

Graph the following quadratic function on this set of axes. State the coordinates of the turning point.

<EFOFEX>
id:fxe{3596a922-f918-4334-b8d2-71a7a4901fd9}
FXGP:DP-3WP65Pn
FXData:

</EFOFEX>

<EFOFEX>
id:fxd{d3e95b43-0ca2-4fe6-97f6-db94b9198850}

FXData:

</EFOFEX>

**Solution**

<EFOFEX>
id:fxd{4eb55cb1-f691-4abf-980d-37eeea3f33db}
FXGP:DP-3WP65Pn
FXData:

</EFOFEX>

**Notes**

360 variations. **Question**

Find the turning point and the equation of the line of symmetry for this quadratic function.

<EFOFEX>
id:fxe{8d5d0c3a-98fe-4e8b-b42b-ee6cff80c202}
FXGP:DP-BePyVgQ
FXData:

</EFOFEX>

**Solution**

<EFOFEX>
id:fxe{0886a3ad-7d7e-436c-9981-505df010c6c5}
FXGP:DP-BePyVgQ
FXData:

</EFOFEX>

**Notes**

360 variations.

**Question**

For the quadratic function <EFOFEX>
id:fxe{d8b29d8c-f125-4603-912c-947163a2ed83}
FXGP:DP-s5FC9cp
FXData:

</EFOFEX>, find the y-intercept roots and turning point and hence, sketch the graph.

<EFOFEX>
id:fxd{9fdb0a96-5730-4e03-abfe-fc410e147cf2}
FXGP:DP-s5FC9cp
FXData:

</EFOFEX>

**Solution**

<EFOFEX>
id:fxe{93cce031-f4cb-4447-bc5e-b42705ce704d}
FXGP:DP-s5FC9cp
FXData:

</EFOFEX>

<EFOFEX>
id:fxd{737a5404-b11d-482d-8c24-e2b167612eda}
FXGP:DP-s5FC9cp
FXData:

</EFOFEX>

**Notes**

48 variations.

**Question**

Write the quadratic function for this graph in the form y=ax2+bx+c.

<EFOFEX>
id:fxd{edf6dca7-df9a-44dd-9455-06b09a3525cf}
FXGP:DP-bHdZdDZ
FXData:

</EFOFEX>

**Solution**

<EFOFEX>
id:fxe{f3758322-ca14-4b57-9710-2f93222ba136}
FXGP:DP-bHdZdDZ
FXData:

</EFOFEX>

**Notes**

648 variations.

**Question**

Write the quadratic function for this graph in the form y=ax2+bx+c.

<EFOFEX>
id:fxd{897aca7f-a94b-4a7e-bc8d-cef84c7254e4}
FXGP:DP-HEuBRa7
FXData:

</EFOFEX>

**Solution**

<EFOFEX>
id:fxe{b91b28a6-6f12-4ac7-880c-12661d9d46e3}
FXGP:DP-HEuBRa7
FXData:

</EFOFEX>

**Notes**

1944 variations.

**Question**

Find the turning point of the quadratic function <EFOFEX>
id:fxe{1d81ad76-4b4e-46d0-b75b-178e22a1f4bc}
FXGP:DP-qyWpNqy
FXData:

</EFOFEX> by completing the square.

**Solution**

<EFOFEX>
id:fxe{234407ac-2c97-4877-965a-88e8abaf8f2d}
FXGP:DP-qyWpNqy
FXData:

</EFOFEX>

**Notes**

324 variations.

**Question**

Find the turning point of the quadratic function <EFOFEX>
id:fxe{79c581b5-00fd-46f5-9cf3-be13390dca49}
FXGP:DP-Zdme8Vn
FXData:

</EFOFEX> by completing the square.

**Solution**

<EFOFEX>
id:fxe{548f143e-d0b2-4e2a-a389-cf48d2cb31a3}
FXGP:DP-Zdme8Vn
FXData:

</EFOFEX>

**Notes**

540 variations.

**Question**

1. Complete the following table by matching each graph (A, B, C, D, E, F) with an equation below. Some graphs may not be matched.

<EFOFEX>
id:fxd{0543409e-7837-4199-a8f8-6fd74bd73d67}
FXGP:DP-UZ7XB4C
FXData:

</EFOFEX>

|  |  |  |  |
| --- | --- | --- | --- |
| <EFOFEX> id:fxe{7f45bada-9cf8-4067-a312-7f59e9b28481} FXGP:DP-UZ7XB4C FXData:  </EFOFEX> | <EFOFEX> id:fxe{0542b3ec-bee0-48a0-afcb-3fc0ea522bab} FXGP:DP-UZ7XB4C FXData:  </EFOFEX> | <EFOFEX> id:fxe{fd959f1d-e0dc-4413-b465-b3546f585ddb} FXGP:DP-UZ7XB4C FXData:  </EFOFEX> | <EFOFEX> id:fxe{f99c613c-9890-4ea6-9928-4a591cb47f10} FXGP:DP-UZ7XB4C FXData:  </EFOFEX> |
|  |  |  |  |

b) The graph of *y* = *x*2 is translated <EFOFEX>
id:fxe{202d5b3e-45ac-49f2-b948-c7bcec685495}
FXGP:DP-JPECFEB
FXData:

</EFOFEX> units to the right and <EFOFEX>
id:fxe{ddc2e6df-f76b-4d2e-9379-31548ec19ae7}
FXGP:DP-JPECFEB
FXData:

</EFOFEX> units down. What is the equation of the new parabola?

[2]

c) (i) The graph of <EFOFEX>
id:fxe{09abede1-46fe-48a2-8a68-321e7ed57d76}
FXGP:DP-7TWRK6T
FXData:

</EFOFEX>is reflected about the *x*- axis, then translated <EFOFEX>
id:fxe{e029c0f5-c2c2-49e7-808c-906aa22feb19}
FXGP:DP-7TWRK6T
FXData:

</EFOFEX> units left and <EFOFEX>
id:fxe{e60b3c03-b765-4d00-b965-bca9a2524c92}
FXGP:DP-7TWRK6T
FXData:

</EFOFEX> units up. What is the equation of the new parabola?

[4]

(ii) What is the turning point, *y* intercept and equation of line of symmetry of the new curve?

**Solution**

a)

|  |  |  |  |
| --- | --- | --- | --- |
| <EFOFEX> id:fxe{80840d28-0101-49fc-bad9-55cadb6ea37a} FXGP:DP-UZ7XB4C FXData:  </EFOFEX> | <EFOFEX> id:fxe{0b13bc2d-ab2d-4e72-bcc1-ab72641c8e88} FXGP:DP-UZ7XB4C FXData:  </EFOFEX> | <EFOFEX> id:fxe{7eb733fe-5638-4880-a620-2a7708340acd} FXGP:DP-UZ7XB4C FXData:  </EFOFEX> | <EFOFEX> id:fxe{730348fb-0fc9-4da1-ac0d-5265675a73aa} FXGP:DP-UZ7XB4C FXData:  </EFOFEX> |
| B | D | E | A |

b) <EFOFEX>
id:fxe{8d2588f3-7786-4dc5-8785-f3a49a308acc}
FXGP:DP-JPECFEB
FXData:

</EFOFEX>

c) <EFOFEX>
id:fxe{f5852f10-5cd9-4e10-af8c-16a73166d17d}
FXGP:DP-7TWRK6T
FXData:

</EFOFEX>

d) <EFOFEX>
id:fxe{8fd3264f-5593-43fa-a861-aa8d43398472}
FXGP:DP-7TWRK6T
FXData:

</EFOFEX>

**Notes**

100 000+ variations.

**Question**

This is the graph of the quadratic function <EFOFEX>

id:fxe{fa6023e7-556f-4b41-9c08-35c07fe80c8b}


FXData:


</EFOFEX>. Using the graph, which of these four statements is correct.

<EFOFEX>

id:fxd{b3e82893-c81b-4113-9013-f55b488f66eb}

FXGP:DP-kCuVJ7h

FXData:


</EFOFEX>

<EFOFEX>

id:fxe{1c1092ae-eb25-45fd-9795-8a64e9857340}

FXGP:DP-kCuVJ7h

FXData:


</EFOFEX>

**Solution**

<EFOFEX>

id:fxe{4fce9c9a-7cf9-4fda-a71d-1aaa38c5f0c1}

FXGP:DP-kCuVJ7h

FXData:


</EFOFEX>

**Notes**

20000+ variations.

**Question**

A farmer has <EFOFEX>
id:fxe{f304655e-bbb2-4bb3-8883-13f2e8848a12}
FXGP:DP-KpSmt8m
FXData:

</EFOFEX> of fencing and decides to build a rectangular yard along the side of an existing shed. The farmer wants to design the yard to enclose the largest area possible for their fencing.

<EFOFEX>
id:fxd{c5e2de62-3490-4700-a4d9-7d9479c5bd15}

FXData:

</EFOFEX>

If the length of the side of the yard is x m long:

1. Write an equation which calculates the area of the enclosed yard.
2. Draw a graph showing how the area of the yard varies depending on the length of the side (x). You can use the axes below to draw your graph.

<EFOFEX>
id:fxd{2f67b19a-7027-4222-b96b-1d01e494c068}
FXGP:DP-KpSmt8m
FXData:

</EFOFEX>

1. Use your graph to estimate the dimensions of the yard which produces the largest enclosed area and the area produced.

**Solution**

1. <EFOFEX>
   id:fxe{3d8c39da-733c-4cda-90d2-7959e21153f7}
   FXGP:DP-KpSmt8m
   FXData:

   </EFOFEX>

<EFOFEX>
id:fxd{edad4b05-22f0-494a-a39d-365dd1fff25e}
FXGP:DP-KpSmt8m
FXData:

</EFOFEX>

1. <EFOFEX>
   id:fxe{e6658403-6a17-48e3-9eeb-4047fa5fb6b3}
   FXGP:DP-KpSmt8m
   FXData:

   </EFOFEX>

**Notes**

26 variations.

**Question**

A bridge is supported by a parabolic arch.

<EFOFEX>
id:fxd{d61cb468-d712-477e-a60a-298e8e879765}
FXGP:DP-Z8UyfCe
FXData:

</EFOFEX>

An engineer needs to determine an equation which models the curve and has drawn the graph below.

<EFOFEX>
id:fxd{fecbe0a0-82c5-403b-bb47-e5e8851698d3}
FXGP:DP-Z8UyfCe
FXData:

</EFOFEX>

Use this information to find the equation of the parabola.

**Solution**

<EFOFEX>
id:fxe{9c1ffb35-d3f6-4953-b2bb-11c4ef54d567}
FXGP:DP-Z8UyfCe
FXData:

</EFOFEX>

**Notes**

400 variations.