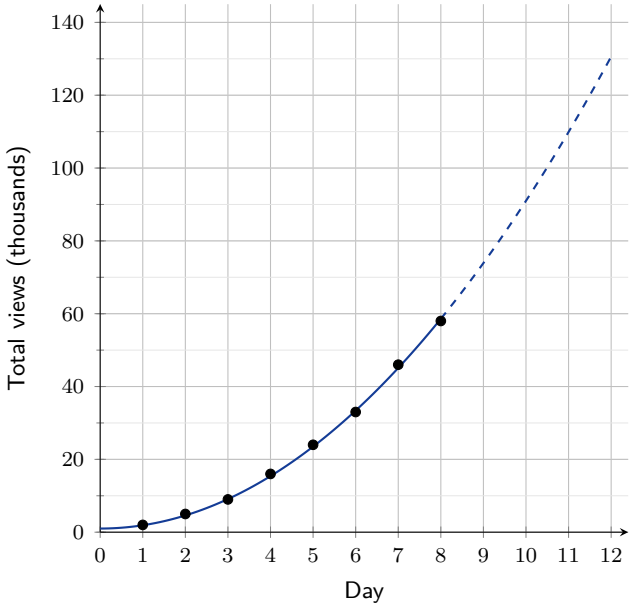
Thread 2 Review

Print double-sided (flip on the long edge: Long-Edge binding): three sheets. Card 1 is double width. The extension is for groups that finish early; the slot beside it is empty. Cut along the frames.

Card 1



A new video went online. The graph shows the total number of views, in thousands, at the end of each of its first 8 days. The curve is a curve of best fit.

Use the curve to predict the total on day 5.5 and on day 12.

Which prediction do you trust more? Why?

Card 2

x	y
-1	3
0	-3
1	-5
2	-3
3	3
4	13

You have this relation only as a table of values.

Is it linear, quadratic, or neither? Show how you know.

Card 3

$$y = x^2 - 6.25$$

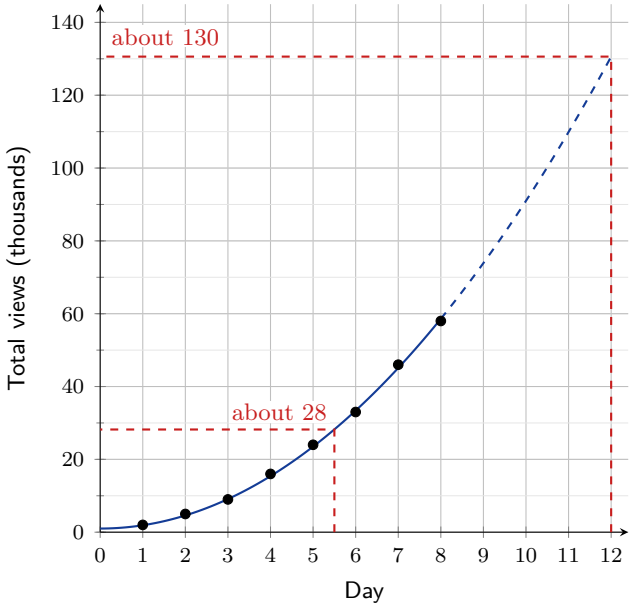
Where does this parabola cross the x-axis?

Find both places without drawing the graph.

Thread 2 Review — Backs

Answers for the cards on the other side of this sheet.

Card 1 — answer



Day 5.5: about 28 thousand views (accept 25 to 31). Day 5.5 lies inside the data (days 1 to 8): an **interpolation**.

Day 12: about 130 thousand views (accept 115 to 145). Day 12 lies beyond the data: an **extrapolation**.

Trust day 5.5 more: there are data on both sides of it. An extrapolation assumes the trend carries on, and a video's views often slow down after its first days.

Card 3 — answer

It crosses where $y = 0$, so where $x^2 = 6.25$.

$2.5^2 = 6.25$, so it crosses at $\boldsymbol{x = 2.5}$, and by symmetry at $\boldsymbol{x = -2.5}$.

It is $y = x^2$ moved 6.25 units down: vertex $(0,\ -6.25)$, below the x-axis and opening up, so it crosses twice.

Card 2 — answer

First differences: -6, -2, 2, 6, 10. They are not constant, so it is not linear.

Second differences: 4 every time. They are constant, so the relation is **quadratic**.

Each difference is the lower value minus the one above it: $-3 - 3 = -6$, $-5 - (-3) = -2$, ...

Thread 2 Review

Print double-sided (flip on the long edge: Long-Edge binding): three sheets. Card 1 is double width. The extension is for groups that finish early; the slot beside it is empty. Cut along the frames.

Card 4

$$y = 0.8x^2$$

Use the step pattern, with no table.

Where does the third step from the vertex land?

Card 5

$$y = -(x-2)^2 + 6$$

On a grid of its own, sketch this parabola by the step pattern.

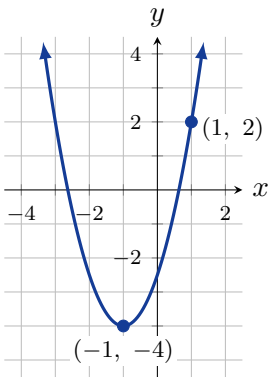
Label the vertex and the axis of symmetry.

Card 6

$$2^{-1} \qquad 3^{0} \qquad (-2)^{-2} \qquad 10^{-1}$$

Put these in order from least to greatest. Show the value of each.

Card 7



The vertex and one more point are marked.

Write the equation of this parabola in vertex form.

Thread 2 Review — Backs

Answers for the cards on the other side of this sheet.

Card 5 — answer

Vertex $(2,\ 6)$; axis of symmetry $x = 2$. Here $a = -1$, so the steps go **down** 1, 3, 5, 7.

Points: $(3,\ 5)$ and $(1,\ 5)$; $(4,\ 2)$ and $(0,\ 2)$; $(5,\ -3)$ and $(-1,\ -3)$; $(6,\ -10)$ and $(-2,\ -10)$.

It opens down, so the vertex gives a maximum value of 6. Check $x = 0$: $-(0-2)^2 + 6 = 2$.

Card 4 — answer

The steps for $y = x^2$ are 1, 3, 5. Multiply each by $a = 0.8$: up 0.8, 2.4, 4.0.

From $(0,\ 0)$: $(1,\ 0.8)$, then $(2,\ 3.2)$, then **$(3,\ 7.2)$**.

Check: $0.8(3)^2 = 0.8 \times 9 = 7.2$.

By symmetry, the third step on the left lands at $(-3,\ 7.2)$.

Card 7 — answer

Vertex $(-1,\ -4)$: $y = a(x+1)^2 - 4$.

Substitute $(1,\ 2)$: $2 = a(1+1)^2 - 4$, so $6 = 4a$ and $a = 1.5$.

$\boldsymbol{y = 1.5(x+1)^2 - 4}$.

Check with the mirror point $(-3,\ 2)$: $1.5(-2)^2 - 4 = 6 - 4 = 2$.

The steps do not help here: one step from the vertex lands at $(0,\ -2.5)$, between grid lines.

Card 6 — answer

$2^{-1} = \frac{1}{2}$, $\quad 3^0 = 1$, $\quad (-2)^{-2} = \dfrac{1}{(-2)^2} = \frac{1}{4}$, $10^{-1} = \frac{1}{10}$.

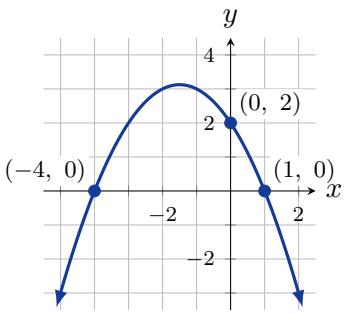
Least to greatest: $\boldsymbol{10^{-1},\ (-2)^{-2},\ 2^{-1},\ 3^0}$.

None is negative: a negative exponent means "one over", and $(-2)^{-2}$ has an even power.

Thread 2 Review

Print double-sided (flip on the long edge: Long-Edge binding): three sheets. Card 1 is double width. The extension is for groups that finish early; the slot beside it is empty. Cut along the frames.

Card 8



The zeros and one more point are marked.

Write the equation of this parabola in intercepts form.

Card 9

A frog jumps from one lily pad to another, 40 cm away. Its greatest height is 10 cm above the water.

Let x be the distance across from the first lily pad and y the height, both in centimetres.

Write an equation that models the jump.

Extension

You have this relation only in words:

a parabola that opens down, has the same shape as $y = x^2$, and has its vertex at $(-2,\ 9)$.

Describe it the other three ways: as an equation, as a table of values, and as a graph on a grid of its own.

Then write it in intercepts form too.

Thread 2 Review — Backs

Answers for the cards on the other side of this sheet.

Card 9 — answer

Put the first lily pad at the origin. The frog is at height 0 at $x = 0$ and $x = 40$: the zeros. Intercepts form:
$y = a(x - 0)(x - 40) = ax(x - 40)$.

The greatest height is midway, at $(20,\ 10)$:
$10 = a(20)(-20) = -400a$, so
$a = -\frac{1}{40} = -0.025$.

$\boldsymbol{y = -0.025x(x - 40)}$, or in vertex form $\boldsymbol{y = -0.025(x - 20)^2 + 10}$.

Check $x = 0$ in vertex form:
$-0.025(400) + 10 = 0$.

Card 8 — answer

Zeros -4 and 1: $y = a(x + 4)(x - 1)$.

Substitute $(0,\ 2)$:
$2 = a(0 + 4)(0 - 1) = -4a$, so $a = -\frac{1}{2}$.

$\boldsymbol{y = -\frac{1}{2}(x + 4)(x - 1)}$.

Check: it opens down, and $a < 0$. The axis is midway, $x = -1.5$, and the vertex is $-\frac{1}{2}(2.5)(-2.5) = 3.125$, which matches the graph.

Extension — answer

x	y
-5	0
-4	5
-3	8
-2	9
-1	8
0	5
1	0

Vertex form:
$y = -(x + 2)^2 + 9$.

First differences $5, 3, 1, -1, -3, -5$; second differences all -2: quadratic.

The zeros are -5 and 1 (the rows where $y = 0$).

Intercepts form:
$y = -(x + 5)(x - 1)$.

Check $x = 0$: $-(5)(-1) = 5$ and $-(2)^2 + 9 = 5$.