

TINY ORANGE / INTEREST TO CONCEPT



JAX AND THE STORM MODEL

Math + storm science + evidence-based writing, with a real transfer check.

ACTIVITY PACK • AGES 11 TO 14 • ABOUT 60 TO 90 MINUTES

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BEFORE THE ACTIVITY

The target and the route

Learning target: represent a linear relationship with a table, graph, and equation; interpret the starting value and rate with units; use evidence to describe where a model is useful and where it fails.

Materials: pencil, ruler, optional graph paper. The data in this pack are deliberately invented for algebra practice. They are not a historical storm track, forecast, tornado intensity measure, or

ROUTE THE NEXT MOVE

If the learner can make the table but not the equation: name what stays the same and what changes each ten minutes.

If the learner swaps the starting value and rate: compare time zero with two later rows, then mark the intercept on the graph.

If division is the barrier: build a ratio table first. If the storm context distracts, model a simpler non-weather situation.

If the learner succeeds: go to the transfer task on page 7. The context changes; the mathematical structure does not.

Use the key to discuss reasoning, not just totals. Let a learner draw, speak, or dictate a first explanation before revising the final writing.

01 / MEET THE QUESTION

Jax loves tornadoes

Jax wants to understand how people use observations and models to describe moving storms. In this activity, he begins with a simplified distance pattern. The goal is to learn algebra that can travel to a different problem later.

OUR FICTIONAL MODEL

At time 0, a storm center is 8 kilometers from a fixed reference line. For this short invented example, its distance increases by 12 kilometers every 10 minutes.

This model tracks distance from one line, not distance from your home, a path of danger, or the strength of a tornado.

Predict: After 20 minutes, what distance would this pattern give? Explain how you know before you fill out the table.

Safety note: Use historical materials or invented numbers for this activity. Follow local official alerts during actual severe weather.

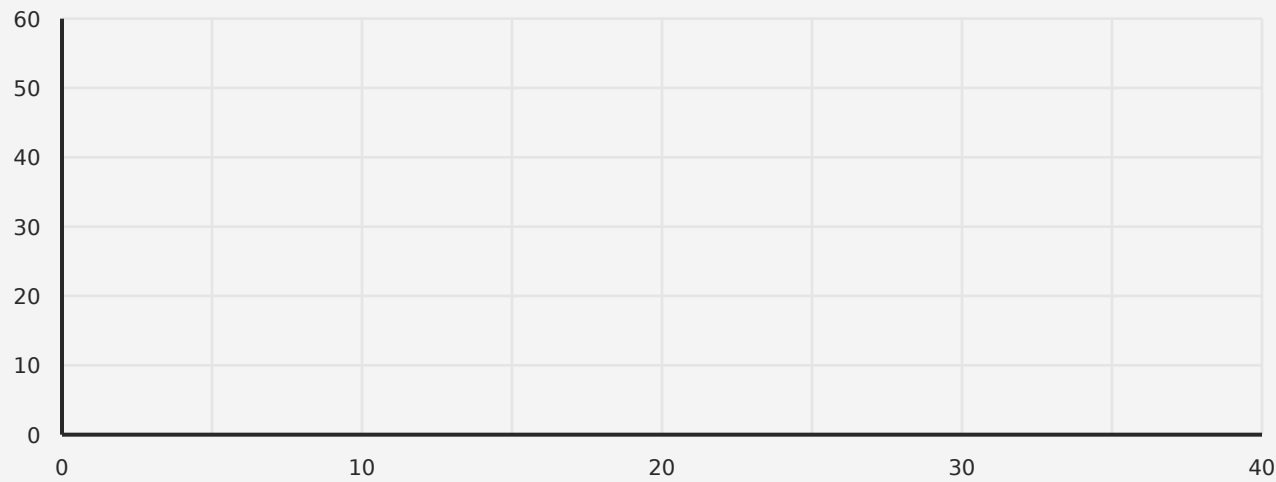
02 / ORGANIZE AND DRAW

The table and graph

Complete the table. Show the distance in kilometers from the fixed line.

Time t (minutes)	Distance d (km)
0	8
10	
20	
30	
40	

Plot each (time, distance) point. Label both axes with units.



03 / NAME THE PATTERN

Build an equation

1. What is the distance at time 0?

2. How much does the distance change in 10 minutes?

3. How much does it change in 1 minute? Include units.

4. Let t be minutes and d be kilometers. Write d in terms of t .

5. Use your equation at $t = 25$ minutes. Show the work.

A model is a tool with assumptions. Real storms do not move in tidy straight lines merely because we have graph paper.

04 / INVESTIGATE THE LIMITS

The world has opinions

Another fictional observation set records 8, 20, 33, and 41 km at 0, 10, 20, and 30 minutes. Compare it with your straight-line prediction. These measurements could differ because the storm changes motion or the measurement has uncertainty.

At 20 minutes, my model predicts ____ km; the new observation is 33 km.

At 30 minutes, my model predicts ____ km; the new observation is 41 km.

Which prediction differs more? By how many kilometers?

What could Jax conclude? What could he NOT conclude?

A. This pattern fits every storm forever. B. This short model can be compared with observations. C. A storm 41 km from a line is safe.

Storm science question: Is a watch the same as a warning? Find the distinction on page 9 before answering.

05 / CHANGE THE SUBJECT

The transfer check

No tornado now. A bike rental charges a \$6 starting fee plus \$3 for each hour. Let h be hours and C be total cost in dollars.

1. What is the cost at 0 hours?

2. Write an equation for C in terms of h .

3. Find the cost at 4 hours and explain each part of your calculation.

4. If the total is \$30, how many hours were rented? Show how you know.

5. What is the same mathematical structure as the storm model? What is different?

A second check on another day is useful: remembering an idea later is a stronger result than recognizing today's example.

06 / WRITE FROM EVIDENCE

Explain the model

Write a short explanation for Jax. Use the numbers and units, distinguish a model from observations, and explain one limitation. You can speak a first draft aloud, then revise it.

CLAIM What relationship does the invented data suggest?

EVIDENCE Which two or more values support your claim?

REASONING Why does the evidence fit the equation, and what does it leave out?

Last line: One thing the model does not tell me is...

A MODEL IS NOT A WARNING

Read official alerts

A tornado watch means tornadoes are possible in or near the area: prepare and stay alert. A tornado warning means a tornado has been sighted or indicated by radar: take action and move to appropriate shelter. The National Weather Service explains the difference and gives current safety directions.

A classroom distance equation cannot tell you whether a location is safe. During real severe weather, use current local alerts and follow official guidance. This pack is for historical or fictional data analysis, never storm chasing.

DISCUSS

Why would a warning demand a different action than a watch? Why can a number such as “41 km” fail to answer whether someone is safe?

Source: National Weather Service, “Understand Tornado Alerts,” [weather.gov/safety/tornado-ww](https://www.weather.gov/safety/tornado-ww). Review the current page when teaching.

FOR THE EDUCATOR

Worked answers

Table and graph

At $t = 0, 10, 20, 30, 40$ minutes, $d = 8, 20, 32, 44, 56$ km. Plot $(0,8), (10,20), (20,32), (30,44), (40,56)$. A straight line is appropriate for this invented pattern.

Equation

The starting value is 8 km. The change is 12 km per 10 minutes, or 1.2 km per minute. $d = 8 + 1.2t$. At $t = 25$, $d = 8 + 30 = 38$ km.

Limits

At 20 minutes, predicted 32 versus observed 33: difference 1 km. At 30, predicted 44 versus observed 41: difference 3 km. The 30-minute prediction differs more. Choose B; neither the model nor the distance alone establishes safety.

Transfer

$C = 6 + 3h$. At 4 hours, $C = \$18$. For \$30: $30 = 6 + 3h$, so $h = 8$ hours. Both situations have a starting amount and constant rate, but the variables, units, and real-world assumptions differ.

Writing

Look for the claim, at least two data values, units, a reason for the slope and intercept, and a meaningful limitation. Accept varied wording when the reasoning is sound.

Alerts

Watch: prepare because tornadoes are possible. Warning: act because one is observed or indicated by radar. Follow current National Weather Service and local guidance.

FOR THE BUYER

What this pack includes

A ready-to-use 60 to 90 minute sequence for one learner or a small group: context, invented data, table and graph, equation prompts, model critique, evidence writing, an unrelated algebra transfer task, official-alert literacy, and worked educator answers.

Suggested use: grades 6 to 8 or any learner ready for a two-variable linear relationship. The teacher or caregiver can shorten the lesson, read prompts aloud, provide graph paper, or revisit the transfer check another day. The target is understanding, not finishing every page at one speed.

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Source for alert definitions: National Weather Service, Understand Tornado Alerts. All mathematical data in the student pages are invented.