# Three Career Offers: Linear vs. Exponential Pay

Model three salary offers over a career and decide which grows into the best deal.

Unit 13: Exponential Growth & Decay | 2–3 class periods | Pairs or groups of 3

Name(s) _____ Period ____ Due _____

## Introduction

Jordan, a new graduate, has three fictional job offers. One gives a flat raise each year; two give percent raises. Your team will model each salary, find when one passes another, total the pay over different stays, and account for the car Jordan must buy for one of the jobs, which loses value every year.

> Offer A: $42,000, plus $2,400 each year. Offer B: $40,000, plus 5% each year. Offer C: $46,000, plus 2.5% each year, but it requires a $26,000 car that depreciates 15% a year.

## Learning goals

- Write linear and exponential salary models.
- Use tables and graphs to find when one model passes another.
- Total pay over 5, 10 and 20 years.
- Model depreciation of a required purchase.
- Recommend an offer for different plans.

## Supporting documents and data

### Offers (fictional)

| Offer | Start | Raise each year |
|---|---|---|
| **A** | $42,000 | +$2,400 |
| **B** | $40,000 | +5% |
| **C** | $46,000 | +2.5% (requires a $26,000 car) |

## Tasks

### Task 1: Models

1. Write a model for each salary after t years.
2. Make a table for t = 0, 5, 10, 15 and 20.

**Deliverable:** Models and table.

### Task 2: Crossovers

1. When does Offer B first pay more than Offer A in a year?
2. Does Offer B ever pass Offer C? When?

**Deliverable:** Crossover years with a graph.

## Task 3: Total pay

1. Total the salary for the first 5, 10 and 20 years for each offer.
2. Which offer is best for each length of stay?

**Deliverable:** Total-pay table.

## Task 4: The car

1. Model the car's value: $V = 26{,}000(0.85)^t$.
2. How much value does the car lose in 5 years? Subtract that from Offer C's 5-year total.

**Deliverable:** Adjusted Offer C.

## Task 5: Recommend

1. Recommend an offer if Jordan stays 5 years, and if Jordan stays 20 years. Include one non-money factor.

**Deliverable:** Written recommendation.

## Reflection

**1.** Why does a smaller percent raise eventually beat a bigger flat raise?

**2.** How did the car change the comparison?

**3.** What else would you want to know about each job?

## Submission checklist

- ☐ Three models
- ☐ Crossover years
- ☐ Total-pay table

- ☐ Car depreciation
- ☐ Recommendation
- ☐ Reflection

## Scoring rubric

| Category (points) | Exemplary (100%) | Proficient (~80%) | Developing (~60%) | Beginning (~30%) |
|---|---|---|---|---|
| **Financial understanding (20)** | Uses vocabulary precisely and explains every financial concept involved, including assumptions. | Mostly accurate explanations with minor vocabulary gaps. | Partial understanding; some concepts misapplied. | Little evidence of understanding. |
| **Mathematical accuracy (25)** | Linear and exponential models, totals and depreciation correct. | 1–2 minor errors that do not change conclusions. | Several errors or missing work. | Calculations largely missing or incorrect. |
| **Analysis & comparison (20)** | Compares every option on the same basis and tests at least one changed assumption. | Compares options with small gaps. | Comparison superficial or uneven. | Little analysis. |
| **Justification (15)** | Recommendation is supported by specific numbers and weighs non-financial factors and risks. | Mostly supported. | Mostly opinion. | No justification. |
| **Communication & presentation (10)** | Clear, organized, well-labeled tables, charts, and writing. | Minor clarity issues. | Hard to follow in places. | Disorganized. |
| **Completion (10)** | Every checklist item complete. | One item missing. | Two or three items missing. | Most items missing. |

**Total: 100 points.** Alternative recommendations earn full credit when supported by accurate evidence.

ALL PEOPLE, BUSINESSES, PLACES, AND NUMBERS IN THIS PROJECT ARE FICTIONAL. RATES AND COSTS ARE ILLUSTRATIVE ASSUMPTIONS.