**Task card 1** — Related Rates with Derivatives

A 25 ft ladder leans against a wall. Its bottom slides away from the wall at 2 ft/s. Find dy/dt, the rate the height y of the top is changing, when the bottom is 7 ft from the wall.

**Task card 2** — Related Rates with Derivatives

Two cars leave the same corner at the same time: one drives east at 55 mph, the other north at 50 mph. How fast is the distance between them changing when the first car is 24 miles east and the second is 32 miles north?

**Task card 3** — Related Rates with Derivatives

Water pours at $24\pi$ cm³/s into a cone-shaped tank, point down, whose height is twice its top radius. How fast is the water level rising when the water is 4 cm deep?

**Task card 4** — Related Rates with Derivatives

Air is pumped into a spherical balloon at $48\pi$ m³/min. How fast is the radius growing when the radius is 2 m?

**Task card 5** — Related Rates with Derivatives

A 10 ft ladder leans against a wall. Its top slides down the wall at 3 ft/s. How fast is the bottom moving away from the wall when the top is 6 ft above the ground?

**Task card 6** — Related Rates with Derivatives

The area of a circle grows at $10\pi$ ft²/min. How fast is the radius growing when the radius is 4 ft?

**Task card 7** Related Rates with Derivatives

A 20 ft ladder leans against a wall. Its bottom slides away from the wall at 1 ft/s. Find dy/dt, the rate the height y of the top is changing, when the bottom is 12 ft from the wall.

**Task card 8** Related Rates with Derivatives

A 10 ft ladder leans against a wall. Its top slides down the wall at 3 ft/s. How fast is the bottom moving away from the wall when the top is 8 ft above the ground?

**Task card 9** Related Rates with Derivatives

Two cars leave the same corner at the same time: one drives east at 55 mph, the other north at 30 mph. How fast is the distance between them changing when the first car is 30 miles east and the second is 40 miles north?

**Task card 10** Related Rates with Derivatives

Water pours at $4\pi$ $m^3$/min into a cone-shaped tank, point down, whose height is twice its top radius. How fast is the water level rising when the water is 2 m deep?

**Task card 11** Related Rates with Derivatives

Air is pumped into a spherical balloon at $16\pi$ $cm^3$/s. How fast is the radius growing when the radius is 2 cm?

**Task card 12** Related Rates with Derivatives

A 25 ft ladder leans against a wall. Its top slides down the wall at 4 ft/s. How fast is the bottom moving away from the wall when the top is 15 ft above the ground?

**Task card 13** Related Rates with Derivatives

The area of a circle grows at 14π ft²/min. How fast is the radius growing when the radius is 5 ft?

**Task card 14** Related Rates with Derivatives

A 25 ft ladder leans against a wall. Its top slides down the wall at 1 ft/s. How fast is the bottom moving away from the wall when the top is 7 ft above the ground?

**Task card 15** Related Rates with Derivatives

Water pours at 4π m³/min into a cone-shaped tank, point down, whose height is twice its top radius. How fast is the water level rising when the water is 8 m deep?

**Task card 16** Related Rates with Derivatives

A 10 ft ladder leans against a wall. Its bottom slides away from the wall at 1 ft/s. Find dy/dt, the rate the height y of the top is changing, when the bottom is 8 ft from the wall.

**Task card 17** Related Rates with Derivatives

Two cars leave the same corner at the same time: one drives east at 50 mph, the other north at 30 mph. How fast is the distance between them changing when the first car is 15 miles east and the second is 20 miles north?

**Task card 18** Related Rates with Derivatives

Water pours at 16π cm³/s into a cone-shaped tank, point down, whose height is twice its top radius. How fast is the water level rising when the water is 8 cm deep?

**Task card 19** Related Rates with Derivatives

Air is pumped into a spherical balloon at $40\pi$ m³/min. How fast is the radius growing when the radius is 6 m?

**Task card 20** Related Rates with Derivatives

A 13 ft ladder leans against a wall. Its top slides down the wall at 1 ft/s. How fast is the bottom moving away from the wall when the top is 5 ft above the ground?

**Task card 21** Related Rates with Derivatives

The area of a circle grows at $18\pi$ in²/s. How fast is the radius growing when the radius is 6 in?

**Task card 22** Related Rates with Derivatives

Water pours at $4\pi$ cm³/s into a cone-shaped tank, point down, whose height is twice its top radius. How fast is the water level rising when the water is 8 cm deep?

**Task card 23** Related Rates with Derivatives

Water pours at $1\pi$ m³/min into a cone-shaped tank, point down, whose height is twice its top radius. How fast is the water level rising when the water is 8 m deep?

**Task card 24** Related Rates with Derivatives

Two cars leave the same corner at the same time: one drives east at 20 mph, the other north at 60 mph. How fast is the distance between them changing when the first car is 60 miles east and the second is 80 miles north?

# Related Rates with Derivatives Task Cards

Recording sheet · Grade 12 · Give exact answers with no units: a whole number, a fraction in simplest form, or a multiple of π written like 24π. A negative rate means the quantity is getting smaller.

Scan to check your answers

Name: _____ Date: _____

| | | | |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 |

# Related Rates with Derivatives Task Cards: Answer Key

Grade 12 · Hard

The answers online

| | | |
|---|---|---|
| **1.** $-\frac{7}{12}$ | **2.** 73 | **3.** 6 |
| **4.** 3 | **5.** $\frac{9}{4}$ | **6.** $\frac{5}{4}$ |
| **7.** $-\frac{3}{4}$ | **8.** 4 | **9.** 57 |
| **10.** 4 | **11.** 1 | **12.** 3 |
| **13.** $\frac{7}{5}$ | **14.** $\frac{7}{24}$ | **15.** $\frac{1}{4}$ |
| **16.** $-\frac{4}{3}$ | **17.** 54 | **18.** 1 |
| **19.** $\frac{5}{18}$ | **20.** $\frac{5}{12}$ | **21.** $\frac{3}{2}$ |
| **22.** $\frac{1}{4}$ | **23.** $\frac{1}{16}$ | **24.** 60 |