

Precalculus - Exponential Functions and the Number e - Test Answer Key

Common Core F-LE.A.2, F-IF.C.8b, F-LE.B.5, F-IF.C.7e · maths-pdf.fr/en/

Worked solutions and scoring notes for the 9-question exponential functions test. Use the scoring line under each solution to award partial credit.

Precalculus · Common Core State Standards: **F-LE.A.2, F-IF.C.8b, F-LE.B.5, F-IF.C.7e**

Question 1 - Evaluate and classify [2 pts]

$$f(3) = 250(0.512) = 128. \text{ The base } 0.8 = 1 - 0.2.$$

128; **decay at 20%**

Scoring: 1 point for $f(3)$, 1 point for decay and the rate.

Question 2 - Write from points [2 pts]

$$a = 4. \ 4b^2 = 36, \text{ so } b^2 = 9 \text{ and } b = 3.$$

$$y = 4 \cdot 3^x$$

Scoring: 1 point for a , 1 point for b .

Question 3 - Population model [2 pts]

$$P(t) = 12000(1.025)^t. \ P(8) \approx 14,621.$$

$$P(t) = 12000(1.025)^t; \text{ **about** } 14,621$$

Scoring: 1 point for the model, 1 point for the value.

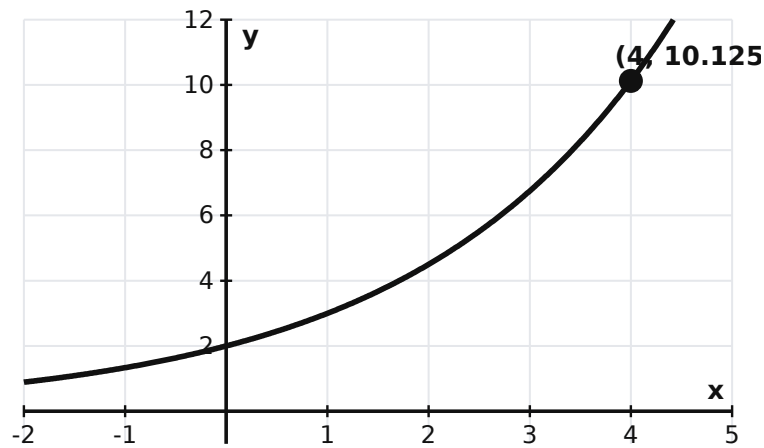
Question 4 - Features of a transformed graph [2 pts]

Shifted left 1 and down 3: asymptote $y = -3$. $y(0) = 2 - 3 = -1$.

$$y = -3; (0, -1)$$

Scoring: 1 point each.

Question 5 - Model from a graph [3 pts]



$$f(4) = 10.125.$$

(a) $a=2$, $b=\frac{3}{2}=1.5$. (b) 50%. (c) $2(1.5)^4 = 2(5.0625) = 10.125$.

$a=2$, $b=1.5$; 50%; 10.125

Scoring: 1 point for each part.

Question 6 - Compound interest [2 pts]

$$3000(1.005)^{60} \approx \$4,046.55.$$

\$4,046.55

Scoring: 1 point for the setup, 1 point for the value.

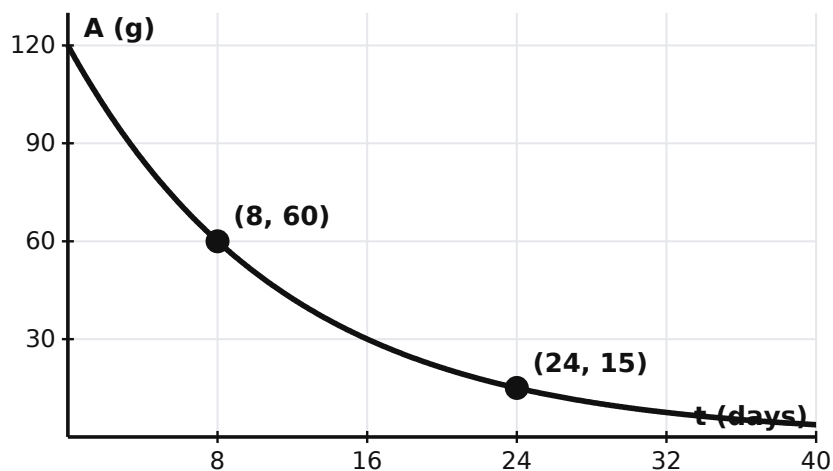
Question 7 - Continuous compounding [2 pts]

$$1500e^{0.4} \approx \$2,237.74.$$

\$2,237.74

Scoring: 1 point for the setup, 1 point for the value.

Question 8 - Half-life [3 pts]



Half remains at $t = 8$; 15 g at $t = 24$.

(a) $120\left(\frac{1}{2}\right)^3 = 15$. (b) $120 \cdot 2^{-1/2} \approx 84.85$. (c) 60 is half of 120, so $t = 8$.

15 g; 84.85 g; 8 days

Scoring: 1 point for each part.

Question 9 - Which earns more? [2 pts]

Yearly: $1000(1.06)^{10} \approx \$1,790.85$. Continuous: $1000e^{0.59} \approx \$1,803.99$.

Continuous: \$1,803.99 is greater than \$1,790.85

Scoring: 1 point for each value with the correct comparison in the second point.

Total
20 points