

CF MATHS

SAT Math Worksheet

Functions

35 mixed questions • linear and nonlinear functions • full solutions only at the end

Complete Questions 1–35 before turning to the solutions. Show enough working to identify the function feature you used: substitution, slope, intercept, table pattern, vertex, growth factor, or transformation.

Questions

1. If $f(x) = 8x + 3$, find $f(6)$.
2. If $g(x) = 5x - 12$ and $g(x) = 43$, find x .
3. A function satisfies $h(4) = 19$. State the ordered pair on the graph of $y = h(x)$.
4. For $f(x) = 3x + b$, $f(7) = 29$. Find b .
5. A linear function passes through $(1, 6)$ and $(5, 22)$. Find its equation.
6. A table contains $(0, 9), (2, 15), (4, 21)$. Find the linear function.
7. Interpret the slope in $D(t) = 420 - 35t$, where D is liters of water and t is hours.
8. Interpret the constant term in $P(n) = 18n - 250$, where P is profit in dollars from selling n items.
9. Find the x -intercept of $y = 6x - 42$.
10. Find the y -intercept of $4x + 5y = 30$.
11. A service charges \$45 initially and \$12 per month. Write a function for cost after m months.
12. Plan A costs $30 + 5x$ and Plan B costs $18 + 7x$. Find the input where costs are equal.
13. Function f has equation $4x + 1$. Function g has table $g(2) = 9, g(6) = 25$. Compare their slopes.

14. Is $y = 7x + 2$ directly proportional? Explain briefly.
15. The outputs of a table are 12, 18, 24, 30 for inputs 0, 1, 2, 3. Classify the relationship.
16. The outputs are 5, 10, 20, 40 for inputs 0, 1, 2, 3. Classify the relationship.
17. For $q(x) = (x - 1)(x - 9)$, find the zeros and axis of symmetry.
18. For $q(x) = 2(x - 4)^2 - 7$, state the vertex and minimum value.
19. For $r(x) = -5(x + 2)^2 + 13$, state the vertex and maximum value.
20. A quadratic has zeros -3 and 11 . At what input does it reach its vertex?
21. For $A(t) = 2500(1.06)^t$, state the initial value and percent growth rate.
22. For $B(t) = 900(0.82)^t$, state the percent decay rate.
23. A quantity starts at 400 and grows by 12% each year. Write an exponential function.
24. A quantity starts at 750 and decreases by 4% each month. Write an exponential function.
25. The graph of $y = f(x)$ is shifted right 3 and down 5. Write the transformed function.
26. The graph of $y = f(x)$ is shifted left 2 and up 7. Write the transformed function.

27. If $f(x) = x^2$ and $g(x) = f(x - 4) + 3$, state the vertex of g .
28. A ticket model is $C(n) = 20 + 8n$ with at most 10 tickets. State a reasonable domain for n .
29. A model $H(t) = 60 - 4t$ gives height in cm after t days. When does the model predict height 0?
30. Function f has slope 2.5 and $f(0) = 8$. Find $f(12)$.
31. A linear model passes through $(20, 150)$ and $(50, 240)$. Predict the output at input 35.
32. A bacteria model is $N(t) = 1200(1.15)^t$. Find $N(2)$.
33. For $p(x) = -2(x - 6)^2 + 18$, find $p(6)$ and interpret the result as a maximum/minimum.
34. Solve $x^2 = 3x + 4$ for positive x by finding where $f(x) = x^2$ and $g(x) = 3x + 4$ intersect.
35. A table gives $F(0) = 200$, $F(1) = 180$, $F(2) = 162$. Determine whether the model is linear or exponential and write a possible formula.

Fully worked solutions

1. $f(6) = 8(6) + 3 = \boxed{51}$.
2. $5x - 12 = 43 \Rightarrow 5x = 55 \Rightarrow \boxed{x = 11}$.
3. Input 4 gives output 19, so the point is $\boxed{(4, 19)}$.
4. $29 = 3(7) + b = 21 + b$, so $\boxed{b = 8}$.
5. $m = (22 - 6)/(5 - 1) = 4$. Then $6 = 4(1) + b$, so $b = 2$. Thus $\boxed{f(x) = 4x + 2}$.
6. Slope $(15 - 9)/(2 - 0) = 3$ and $f(0) = 9$, so $\boxed{f(x) = 3x + 9}$.
7. The slope is -35 liters/hour: water decreases by $\boxed{35 \text{ L per hour}}$.
8. $P(0) = -250$: before any items are sold, the model begins at a $\boxed{\$250 \text{ loss}}$.
9. $6x - 42 = 0 \Rightarrow x = 7$, so $\boxed{(7, 0)}$.
10. Set $x = 0$: $5y = 30 \Rightarrow y = 6$, so $\boxed{(0, 6)}$.
11. $\boxed{C(m) = 45 + 12m}$.
12. $30 + 5x = 18 + 7x \Rightarrow 12 = 2x \Rightarrow \boxed{x = 6}$.
13. $m_f = 4$. For g , $m_g = (25 - 9)/(6 - 2) = 4$. The slopes are $\boxed{\text{equal}}$.
14. No. A direct proportion must have form $y = kx$ and pass through the origin; here the intercept is 2.
15. Equal input steps give constant differences $+6$, so it is $\boxed{\text{linear}}$.
16. Equal input steps multiply output by 2, so it is $\boxed{\text{exponential}}$.
17. Zeros: 1 and 9. Axis: $x = (1 + 9)/2 = \boxed{5}$.
18. Vertex $\boxed{(4, -7)}$; it opens upward, so minimum value $\boxed{-7}$.
19. Vertex $\boxed{(-2, 13)}$; it opens downward, so maximum value $\boxed{13}$.
20. Midpoint of zeros: $(-3 + 11)/2 = \boxed{4}$.
21. Initial value $\boxed{2500}$; growth factor 1.06 means $\boxed{6\%}$ growth.
22. $1 - 0.82 = 0.18$, so $\boxed{18\%}$ decay.
23. $\boxed{A(t) = 400(1.12)^t}$.
24. $\boxed{B(t) = 750(0.96)^t}$.
25. Right 3 means $x - 3$ inside; down 5 means subtract 5: $\boxed{g(x) = f(x - 3) - 5}$.
26. Left 2 means $x + 2$; up 7 gives $\boxed{g(x) = f(x + 2) + 7}$.
27. $g(x) = (x - 4)^2 + 3$, so vertex $\boxed{(4, 3)}$.
28. Ticket count is whole and between 0 and 10: $\boxed{n \in \{0, 1, \dots, 10\}}$.

29. $60 - 4t = 0 \Rightarrow t = \boxed{15}$ days.

30. $f(x) = 2.5x + 8$, so $f(12) = 30 + 8 = \boxed{38}$.

31. Slope $(240 - 150)/(50 - 20) = 3$. From $150 = 3(20) + b$, $b = 90$. At 35: $3(35) + 90 = \boxed{195}$.

32. $N(2) = 1200(1.15)^2 = 1200(1.3225) = \boxed{1587}$.

33. $p(6) = -2(0)^2 + 18 = \boxed{18}$. Because it opens downward, this is the maximum.

34. $x^2 = 3x + 4 \Rightarrow x^2 - 3x - 4 = 0 = (x - 4)(x + 1)$. Positive solution $\boxed{x = 4}$.

35. Ratios are $180/200 = 0.9$ and $162/180 = 0.9$, so exponential decay: $\boxed{F(t) = 200(0.9)^t}$.