Practice Calculus Readiness Test

Instructions:

- Read each problem carefully. Then work the problem on a separate sheet of paper and click on the box next to the correct choice. If you change your mind, just click on a different choice.
- Use the navigational buttons at the bottom of each page to go to the next or previous page.
- A calculator is not required for any questions on this test.
- This practice test consists of 25 problems. Click on "Begin Quiz", then begin.

Begin Quiz

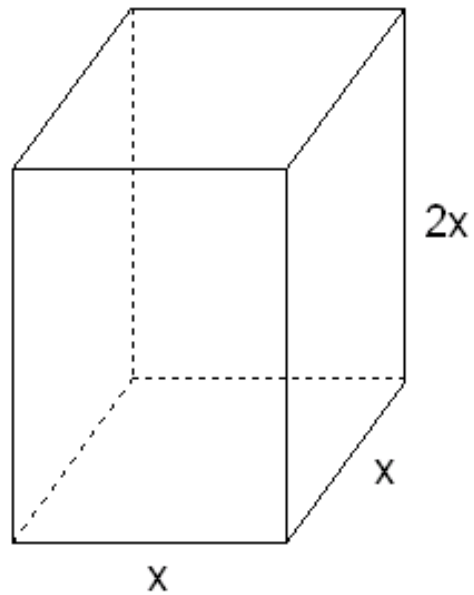
1. Money in a bank triples every 8 years. If \$100 is deposited today, what will its value be after 32 years?

☐ $\$8,500$ ☐ $\$8,100$ ☐ $\$1,600$ ☐ $\$400$

2. The y-coordinate of the point of intersection of the graph of $-x + 4y = -50$ and $x + y = 20$ is

☐ 6 ☐ 0 ☐ -14 ☐ -6

3. The rectangular box shown below has a square base and a closed top. The height is twice the length of one side of the base. Its surface area in terms of x is



☐ $20x$ ☐ $8x + 2x^2$ ☐ $10x^2$ ☐ $6x$

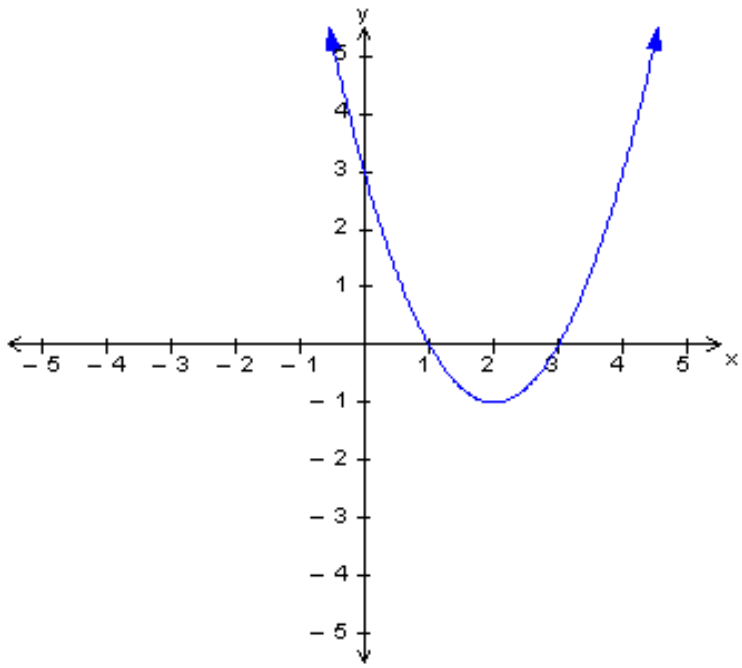
4. If 2^{13} is approximately equal to 8000, then, of the following, which best approximates 2^{26}?

☐ $640,000$ ☐ $6,400,000$ ☐ $64,000,000$ ☐ 8000^{13}

5. $2^{-5} \cdot 64^{2/3} =$

☐ 512 ☐ $\frac{1}{512}$ ☐ 1 ☐ $\frac{1}{2}$

6. If f is a function whose graph is the parabola sketched below then $f(x) < 0$ whenever



☐ $x < 1$ or $x > 3$

☐ $x < 1$

☐ $x > 3$

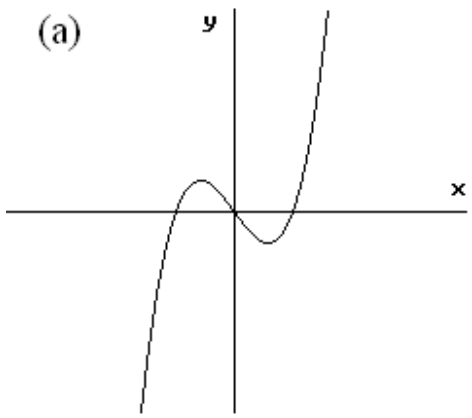
☐ $1 < x < 3$

7. If $\log_2(x - 6) = 6$ then $x =$

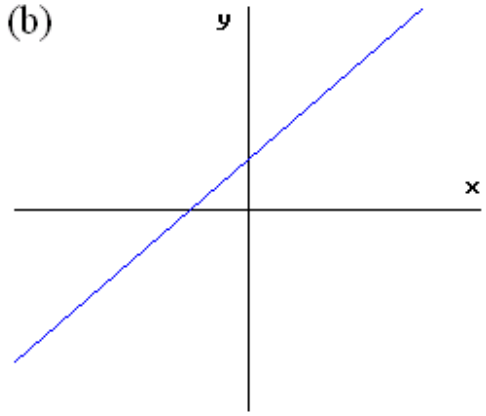
☐ 70 ☐ 64 ☐ 58 ☐ $\frac{6}{\log_2 6} + 6$

8. A function f is even if $f(-x) = f(x)$ for each x in the domain of f. Of the following, which best represents the graph of an even function?

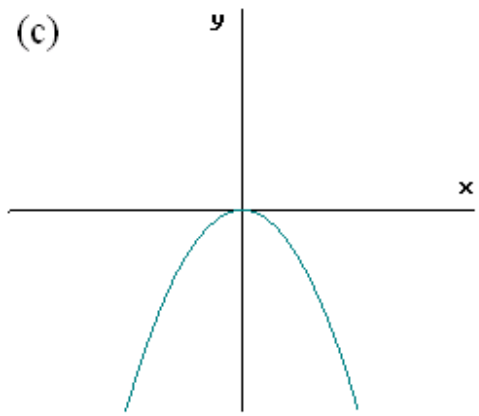
(a)



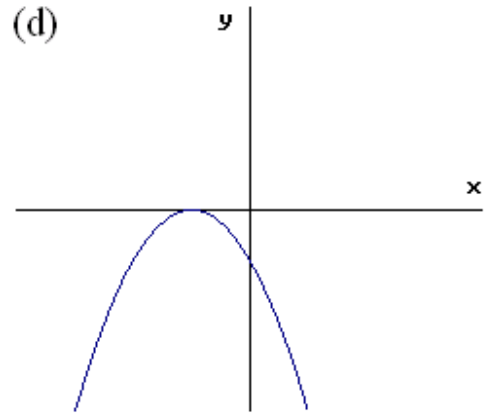
(b)



(c)



(d)

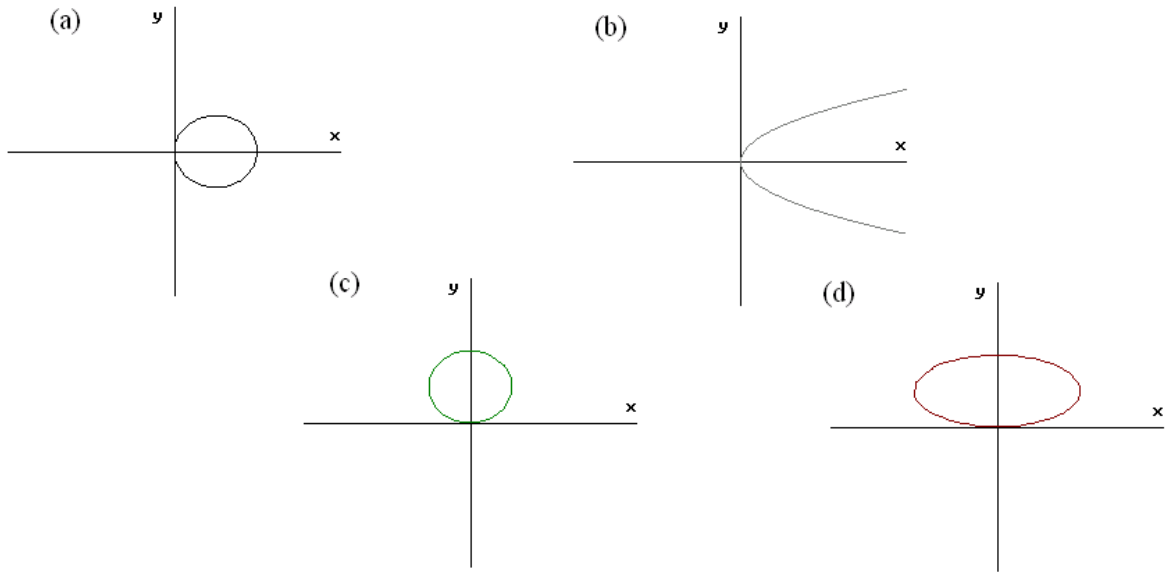


☐ (a) ☐ (b) ☐ (c) ☐ (d)

9. If $\dfrac{(2x-3)(x+5)}{x-7} = 0$ then $x =$

☐ $5, 7, -\frac{3}{2}$ ☐ 5 or $\frac{3}{2}$ ☐ -5, 7, or $\frac{3}{2}$ ☐ -5 or $\frac{3}{2}$

10. Of the following, which best represents the graph of $x^2 + y^2 - 2y = 0$?



☐ (a) ☐ (b) ☐ (c) ☐ (d)

11. If $f(x) = \frac{5x+3}{2x+3}$ then $f(n+1) =$

☐ $\frac{8}{5}$ ☐ $\frac{5n+3}{2n+3} + 1$ ☐ $\frac{5n+8}{2n+5}$ ☐ $\frac{5n+4}{2n+4}$

12. The slope of the line that goes through the points $(-5, 4)$ and $(3, -12)$ is

☐ $-\frac{1}{2}$ ☐ 8 ☐ -2 ☐ 4

13. Find all solutions to the equation $3x^2 = 4x + 1$.

- ☐ $4/3,\ 1/3$
- ☐ $\frac{2+\sqrt{7}}{3}, \frac{2-\sqrt{7}}{3}$
- ☐ $\frac{4+3\sqrt{2}}{6}, \frac{4-3\sqrt{2}}{6}$
- ☐ $\frac{2+\sqrt{2}}{3}, \frac{2-\sqrt{2}}{3}$

14. In a standard coordinate system, the graph of the equation $y = -3x+7$ is

- ☐ a line falling to the right
- ☐ a line rising to the right
- ☐ a horizontal line
- ☐ not a line

15. The inequality $|x - 4| \leq 8$ is equivalent to

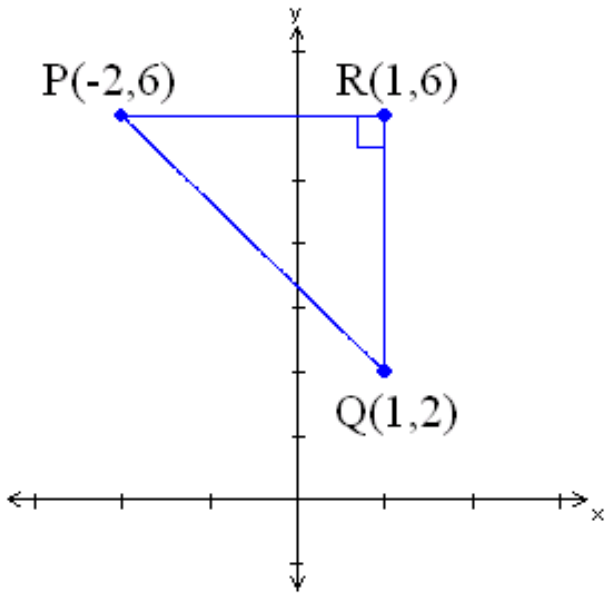
- ☐ $-4 \leq x \leq 12$
- ☐ $-12 \leq x \leq 4$
- ☐ $-12 \leq x \leq 12$
- ☐ $x \leq 12$

16. The quantity $a - b$ is a factor of how many of the following?

$$a^2 - b^2 \qquad a^2 + b^2 \qquad a^3 - b^3 \qquad a^3 + b^3$$

- ☐ one only
- ☐ two only
- ☐ three only
- ☐ four

17. In the figure shown below, what is the distance between the points P and Q?

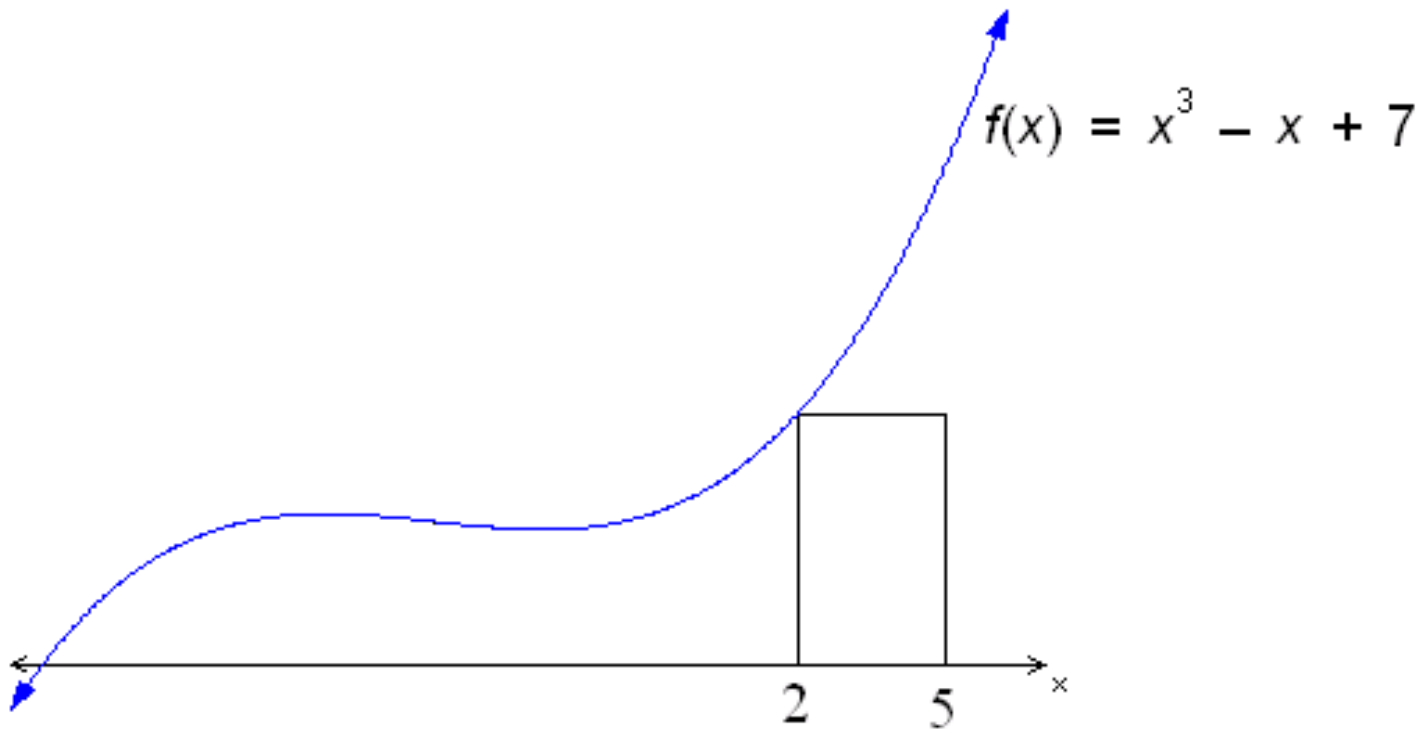


☐ 11 ☐ 7 ☐ 6 ☐ 5

18. The length of a certain rectangle is 6 meters more than twice its width. What is the perimeter of the rectangle if the area of the rectangle is 260 square meters?

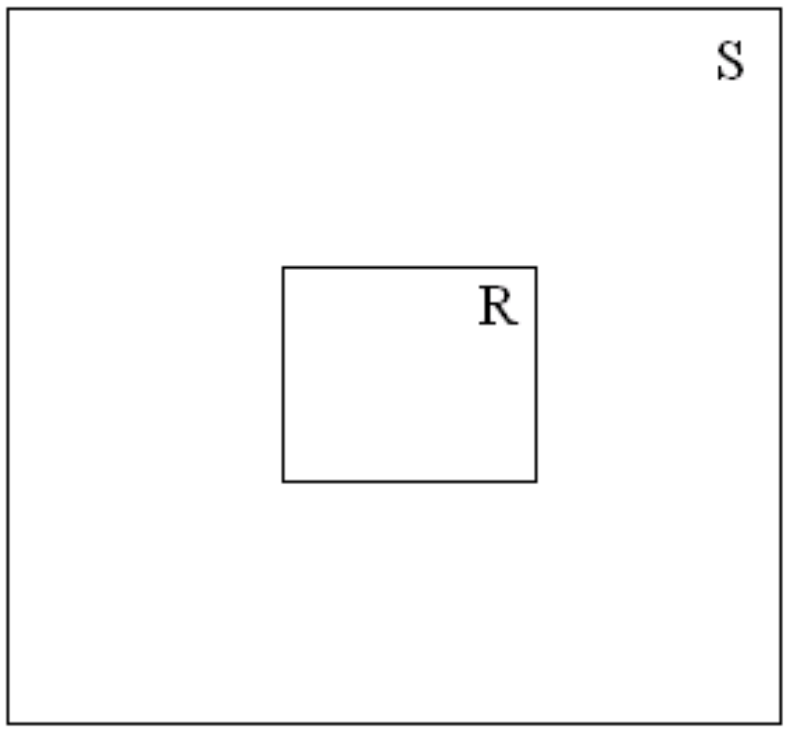
☐ 54 meters ☐ 60 meters ☐ 66 meters ☐ 72 meters

19. What is the area of the rectangle shown in the figure below? (Note: The figure is not drawn to scale.)



☐ 3 ☐ 27 ☐ 31 ☐ 39

20. A rectangle R has width x and length y. A rectangle S is formed from R by multiplying each of the sides of the rectangle R by 4 as shown in the figure below. What is the area of the portion of S lying outside R? (Note: The figure is not drawn to scale.)



☐ $16xy$ ☐ $15xy$ ☐ $4xy$ ☐ x^4y^4

21. What is the radian measure of an angle whose degree measure is $240°$?

☐ $\frac{\pi}{3}$ ☐ $\frac{2\pi}{3}$ ☐ $\frac{3\pi}{4}$ ☐ $\frac{4\pi}{3}$

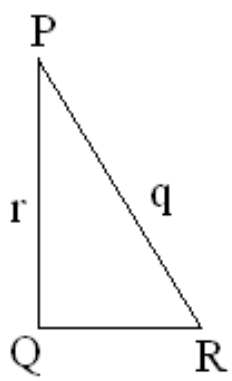
22. $\csc(30°) =$

☐ 2 ☐ $\frac{2}{\sqrt{3}}$ ☐ $\sqrt{2}$ ☐ $\sqrt{3}$

23. For which values of x in the interval $0 \leq x \leq 2\pi$ does $(\sin x - 1)(\sin x - 5) = 0$?

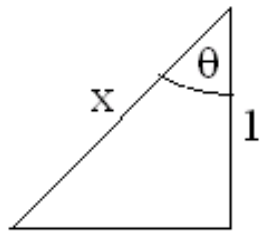
☐ $\frac{\pi}{2}$ only ☐ 1 and 5 ☐ π ☐ 0 and 2π

24. In the figure below, if $\sin R = \frac{5}{8}$ and $r = 2$, then what is q?



☐ $\frac{16}{5}$ ☐ $\frac{5}{4}$ ☐ 5 ☐ $\frac{5}{16}$

25. In the right triangle shown in the figure below, $\tan\theta =$



☐ x ☐ $x\sqrt{x^2-1}$ ☐ x^2+1 ☐ $\sqrt{x^2-1}$

End Quiz

- Click on "End Quiz" to have the computer grade your test. Then click on "Correct My Answers" to see which questions you got wrong.
- Click on the green dots to see detailed solutions for each problem.

Score: Correct

Solutions to Practice Calculus Readiness Test

Solution to Question 1: In 8 years the value will be $3 \times 100 = 300$. Eight years later (after a total of 16 years), the value will be $3 \times 300 = 900$. Eight years after that (after a total of 24 years) the value will be $3 \times 900 = 2700$. And eight years after that (after a total of 32 years) the value will be $3 \times 2700 = 8100$. Return

Solution to Question 2: Adding the two equations we obtain $5y = -30$ or $y = -6$. Return

Solution to Question 3: The areas of the top and bottom are each $x \times x = x^2$. The area of each of the four sides is $x \times 2x = 2x^2$. So the total surface area is $2(x^2) + 4(2x^2) = 2x^2 + 8x^2 = 10x^2$. Return

Solution to Question 4: $2^{26} = \left(2^{13}\right)^2 = (8000)^2 = 64,000,000.$

Return

Solution to Question 5: $2^{-5} = \frac{1}{2^5} = \frac{1}{32}$ and $64^{2/3} = \left(\sqrt[3]{64}\right)^2 = (4)^2 = 16$, so $2^{-5} \cdot 64^{2/3} = \frac{1}{32} \cdot 16 = \frac{16}{32} = \frac{1}{2}$. Return

Solution to Question 6: The graph is below the x axis for $1 < x < 3$.

Return

Solution to Question 7: $\log_2(x-6) = 6 \Rightarrow 2^6 = x - 6 \Rightarrow x = 2^6 + 6 = 64 + 6 = 70$.

Return

Solution to Question 8: If $f(x) = f(-x)$ for all x, the the graph of f must be symmetric with respect to the y axis. The only graph that has this symmetry is (c). Return

Solution to Question 9: $\dfrac{(2x-3)(x+5)}{x-7} = 0 \Rightarrow 2x-3=0$ or $x+5=0 \Rightarrow x=\frac{3}{2}$ or $x=-5$.

Return

Solution to Question 10: Any equation of the form $Ax^2 + Ay^2 + Bx + Cy + D = 0$ is a circle, which narrows the choices to (a) and (c). Completing the square, we see that $x^2 + y^2 - 2y + 1 = 1 \Rightarrow x^2 + (y-1)^2 = 1$. We know that $(x-h)^2 + (y-k)^2 = r^2$ describes a circle with center (h, k) and radius r. Hence our circle has radius $(0, 1)$ and radius 1, which is choice (c). Return

Solution to Question 11:

$$f(n+1) = \frac{5(n+1)+3}{2(n+1)+3} = \frac{5n+5+3}{2n+2+3} = \frac{5n+8}{2n+5}$$

Return

Solution to Question 12: The slope is

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{-12 - 4}{3 - (-5)} = \frac{-16}{8} = -2$$

Return

Solution to Question 13: We use the quadratic formula to solve the equation $3x^2 - 4x - 1 = 0$ with $a = 3$, $b = -4$, and $c = -1$. So

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{4 \pm \sqrt{16 + 12}}{6} = \frac{4 \pm \sqrt{28}}{6} = \frac{4 \pm 2\sqrt{7}}{6} = \frac{2 \pm \sqrt{7}}{3}$$

So the solutions are $\frac{2+\sqrt{7}}{3}$ and $\frac{2-\sqrt{7}}{3}$. Return

Solution to Question 14: The graph of $y = mx + b$ is a straight line. Since the slope $m = -3$ is negative, the graph of this line is falling to the right. Return

Solution to Question 15:

$$|x-4| \leq 8 \Rightarrow -8 \leq x-4 \leq 8 \Rightarrow (-8)+4 \leq x \leq 8+4 \Rightarrow -4 \leq x \leq 12$$

Return

Solution to Question 16: Recall that $a^2 - b^2 = (a-b)(a+b)$, $a^3 - b^3 = (a-b)(a^2+ab+b^2)$, and $a^3 + b^3 = (a+b)(a^2-ab+b^2)$ (a^2+b^2 does not factor). So $a+b$ is a factor of $a^2 - b^2$ and $a^3 + b^3$ only. Return

Solution to Question 17: The distance from P to R is $1-(-2)=3$, and the distance from R to Q is $7-3=4$. By the Pythagorean Theorem, the distance from P to Q is $\sqrt{3^2+4^2}=\sqrt{9+16}=\sqrt{25}=5$. Return

Solution to Question 18: If we let w be the width of the rectangle, then its length is $l = 2w + 6$, so the area is $l \times w = (2w + 6)w = 2w^2 + 6w$. Since the area is 260, we have $2w^2 + 6w = 260 \Rightarrow 2w^2 + 6w - 260 = 0 \Rightarrow w^2 + 3w - 130 = 0 \Rightarrow (w + 13)(w - 10) = 0 \Rightarrow w = 10, -13$. Since w must be positive, the width of the rectangle must be 10 meters, so the length is $2w + 6 = 26$ meters, and so the perimeter is $2l + 2w = 20 + 52 = 72$ meters. Return

Solution to Question 19: The width of the rectangle is $5 - 2 = 3$. The height of the rectangle is $f(2) = 2^3 - 2 + 7 = 8 - 2 + 7 = 13$. So the area is $3 \times 13 = 39$. Return

Solution to Question 20: The area of rectangle S is $(4x)(4y) = 16xy$. The area of rectangle R is xy. So the area of the portion of S lying outside R is $16xy - xy = 15xy$. Return

Solution to Question 21: Since π radians equals 180 degrees, we convert from degrees to radians by multiplying by $\frac{\pi}{180}$:

$$240 \cdot \frac{\pi}{180} = \frac{4\pi}{3}$$

Return

Solution to Question 22: Recall that $\sin(30°) = 1/2$, so $\csc(30°) = \frac{1}{1/2} = 2$ Return

Solution to Question 23:

$$(\sin x - 1)(\sin x - 5) = 0 \Rightarrow \sin x = 1 \text{ or } \sin x = 5$$

Since $\sin x$ is always between -1 and 1, there are no values of x for which $\sin x = 5$. The only value of x in the interval $0 \leq x \leq 2\pi$ for which $\sin x = 1$ is $x = \frac{\pi}{2}$.

Return

Solution to Question 24:

$$\frac{5}{8} = \sin R = \frac{r}{q} = \frac{2}{q} \Rightarrow 16 = 5q \Rightarrow q = \frac{16}{5}$$

Return

Solution to Question 25: By the Pythagorean Theorem, the third side of the triangle has length $\sqrt{x^2-1}$. So $\tan\theta = \dfrac{\text{opposite}}{\text{adjacent}} = \dfrac{\sqrt{x^2-1}}{1} = \sqrt{x^2-1}$.

Return