2025-2026

MATH EOT3 – 12 General

Ms. Fatima Al Saeedi

اللهم إني أسألك فهم النبيين وحفظ المرسلين والملائكة المقربين.

رب أدخلني مدخل صدق، وأخرجني مخرج صدق، واجعل لي من لدنك سلطانا نصيرًا.

اللَّهمَّ لا سَهْلَ إلَّا ما جعَلْتَه سَهلًا وأنتَ تجعَلُ الحَزْنَ سَهلًا إذا شِئْتَ.

اللهم ارزقهم قوة الحفظ، وسرعة الفهم وصفاء الذهن، اللهم ألهمهم الصواب في الجواب.

اللهم انى توكلت عليك، وسلمت أمري إليك، لا ملجأ ولا منجى منك إلا إليك آمنت بكتابك الذي أنزلت ونبيك الذي أرسلت.

Reveal MATH

Academic Year العام الدراسي	2025/2026
Term الفصل	3
Subject	Mathematics/(Bridge,Reveal)
المادة	الرياضيات/(بريدج و ريفيل)
Grade الصف	12
Stream	General
المسار	العام

Number of MCQ عدد الأسئلة الموضوعية	30
Marks of MCQ درجة الأسئلة الموضوعية	(3,4)
Type of All Questions نوع كافة الأسئلة	MCQ/ أسئلة موضوعية
Maximum Overall Grade الدرجة القصوى الممكنة	100
Exam Duration - مدة الامتحان	120 minutes
Mode of Implementation -طريقة التطبيق	SwiftAssess
Calculator	Allowed
الآلة الحاسبة	مسموحة

MCQ (3-4 marks)

1	تبسيط التعابير النسبية		
	Simplify rational expressions.	Example 2 & Check	312
2	تبسيط التعابير النسبية		
	Simplify rational expressions by multiplying and dividing	Example 3	313
3	تبسيط الكسور الجبرية المركبة المتضمنة تعابير نسبية		
	Simplify rational expressions by multiplying and dividing	Example 5 & Check	314
4	جمع التعابير النسبية وطرحها		
	Add and subtract rational expressions	Example 1	319 & 320
5	جمع التعابير النسبية وطرحها		
	Add and subtract rational expressions	Example 2	320
6	تحديد خصائص دوال المقلوب		
	Determine properties of reciprocal functions	Key Concept • Reciprocal Functions	327

MCQ (3-4 marks)

7	تحديد خصائص دوال المقلوب		
	Determine properties of reciprocal functions.	(23,24)	334
8	تمثيل تحويلات دوال المقلوب بيانيًا		
	Graph transformations of reciprocal functions.	Example 4 & Check	331 & 332
9	تمثيل الدوال النسبية ذات خطوط التقارب الأفقية والرأسية بيانيًا		
	Graph rational functions with vertical and horizontal asymptotes.	Key Concept • Vertical and Horizontal Asymptotes	337
10	تمثيل الدوال النسبية ذات خطوط التقارب الأفقية والرأسية بيانيًا		
	Graph rational functions with vertical and horizontal asymptotes.	Example 1	337 & 338
11	تمثيل الدوال النسبية ذات خط التقارب المائل ونقطة الانفصال بيانيا		
	Graph rational functions with oblique asymptotes and point discontinuity.	Key Concept • Oblique Asymptotes	340
12	تمثيل الدوال النسبية ذات خط التقارب المائل ونقطة الانفصال بيانيا		
	Graph rational functions with oblique asymptotes and point discontinuity.	Example 5	342

MCQ (3-4 marks)

13	حل المعادلات النسبية		
	Solve rational equations .	Example 1	355
14	حل المعادلات النسبية		
	Solve rational equations .	Example 2	356
15	رسم الزوايا في وضع قياسي وإيجادها		
	Draw and find angles in standard position.	Example 1 & Example 2 & Check	418
16	رسم الزوايا في وضع قياسي وإيجادها		
	Draw and find angles in standard position.	Example 3	418
17	التحويل بين القياس بالدرجات والقياس بالراديان.		
	Convert between degrees and radian measures and find arc lengths by using central angles.	Example 4 & Example 5	420
18	التحويل بين القياس بالدرجات والقياس بالراديان.		
	Convert between degrees and radian measures and find arc lengths by using central angles.	Key Concept • Arc Length & (63,64)	419 & 422

MCQ (3-4 marks)

19	إيجاد قيم النسب المثلثية		
	Find values of trigonometric ratios.	Example 1	425
20	إيجاد قيم النسب المثلثية		
	Find values of trigonometric ratios.	Example 2 & Check	426
21	إيجاد قيم النسب المثلثية باستخدام زوايا المرجع		
	Find values of trigonometric functions by using reference angles.	Example 5	429
22	إيجاد قيم النسب المثلثية باستخدام زوايا المرجع		
	Find values of trigonometric functions by using reference angles.	Example 6 & Check	430
23	التعرف على دائرة الوحدة والنسب المثلثية		
	Identify the unit circle and trigonometric ratios.	Example 1	436
24	استخدام خصائص الدوال الدورية لإيجاد قيمة الدوال المثلثية		
	Use the properties of periodic functions to evaluate trigonometric functions.	(13-18)	441

MCQ (3-4 marks)

25	استخدام خصائص الدوال الدورية لإيجاد قيمة الدوال المثلثية		
	Use the properties of periodic functions to evaluate trigonometric functions.	Example 5 & Check	440
26	وصف دوال الجيب (sin) وجيب التمام (cos) والظل (tan) وتمثيلها بيانيا		
	Describe and graph the sine, cosine, and tangent functions.	Key Concept • Sine and Cosine Functions	445
27	وصف دوال الجيب (sin) وجيب التمام (cos) والظل (tan) وتمثيلها بيانيا		
	Describe and graph the sine, cosine, and tangent functions.	(5-10)	451
28	وصف دوال الجيب (sin) وجيب التمام (cos) والظل (tan) وتمثيلها بيانيا		
	Describe and graph the sine, cosine, and tangent functions.	(24-26)	452
29	وصف دوال الجيب (sin) وجيب التمام (cos) والظل (tan) وتمثيلها بيانيا		
	Describe and graph the sine, cosine, and tangent functions.	Example 1 & Check	455 & 456
30	وصف الدوال المثلثية غير دوال الجيب (sin) وجيب التمام (cos) والظل (tan) وتمثيلها بيانيا		
	Describe and graph trigonometric functions other than sine, cosine, and tangent.	Key Concept • Graphs of Reciprocal Functions	458

Simplify each expression.

$\frac{(6x^2-5xy)(x+2y)}{(x+y)(5y-6x)}$	$\frac{(7y-3x)(5x-1)}{(5x^3+x^2)(3x-7y)}$	$\frac{9x^2-x^3}{x^2-3x-54}$	$\frac{16-c^2}{c^2+c-20}$
A) $\frac{x(x+2y)}{x+y}$ B) $-\frac{x(x+2y)}{x+y}$ C) $\frac{x(x+y)}{x+y}$ D) $\frac{-x(x+2y)}{x-y}$	A) $-\frac{5x-1}{x^2(5x+1)}$ B) $\frac{(7y-3x)(5x-1)}{x^2(5x+1)(3x-7y)}$ C) $\frac{1}{x^2}$ D) $\frac{5x-1}{5x^3+x^2}$	A) $-\frac{x^2}{x+6}$ B) $\frac{x^2}{x+3}$ C) $\frac{x^2}{x+6}$ D) $-\frac{x^2}{x-3}$	A) $\frac{c-4}{c+5}$ B) $-\frac{c+4}{c-2}$ C) $\frac{c-4}{c+2}$ D) $-\frac{c+4}{c+5}$

Simplify each expression.

$\frac{3x}{8y}\cdot\frac{12x^2y}{9xy^3}$	$\frac{10d^5}{6cd}\div\frac{30c^3d^2}{4c}$	$\frac{14xy^2z^3}{21w^4x^2z}\cdot\frac{7wxyz}{12w^2y^3z}$	$\frac{64a^2b^5}{35b^2c^3f^4}\div\frac{12a^4b^3c}{70abcf^2}$
A) $\frac{y^3}{2x^2}$	A) $\frac{d}{9c^3}$	A) $\frac{z^2}{18w^3}$	A) $\frac{32b}{3ac^3f^2}$
B) $\frac{x^2}{8y^3}$	B) $\frac{2d^2}{9c^3}$	B) $\frac{7z}{18w^5}$	B) $\frac{32b}{ac^3f^2}$
C) $\frac{x}{72y^3}$	C) $\frac{d^2}{9c^3}$	C) $\frac{7z^2}{18w^5}$	C) $\frac{32ba^{-1}}{3cf}$
D) $\frac{x^2}{2y^3}$	D) $\frac{2d}{9c^2}$	D) $\frac{7z}{18w^2}$	D) $\frac{32b}{3ac^3f^3}$

Simplify each expression.

$\dfrac{\frac{3x}{x-y}}{\frac{6xy}{4x^2-4y^2}}$	$\dfrac{\frac{x^2-9y^2}{xy}}{\frac{2x+6y}{x^2}}$	$\dfrac{\frac{y-x}{z^3}}{\frac{x-y}{6z^2}}$	$\dfrac{\frac{a^2-b^2}{b^3}}{\frac{b^2-ab}{a^2}}$
A) $\frac{(x+y)}{y}$ B) $\frac{(x-y)}{y}$ C) $\frac{2(x-y)}{y}$ D) $\frac{2(x+y)}{y}$	A) $\frac{x(x-y)}{y}$ B) $\frac{x(x+3y)}{2y}$ C) $\frac{x(x-3y)}{2y}$ D) $\frac{x(x-y)}{2y}$	A) $-\frac{6}{z}$ B) $\frac{6}{z}$ C) $\frac{3}{z}$ D) $-\frac{3}{z}$	A) $\frac{a^2(a+b)}{b^4}$ B) $\frac{a(a+b)}{b^3}$ C) $\frac{a+b}{b^3}$ D) $\frac{a-b}{b^4}$

Simplify each expression.

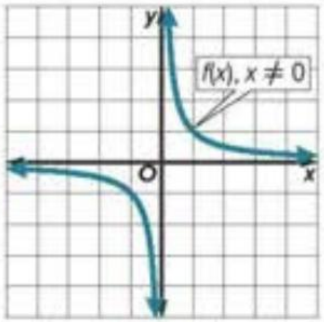
$\frac{7a}{4b}+\frac{4c^2}{10}$	$\frac{2x}{9y}-\frac{7y}{6z}$	$\frac{3}{x}+\frac{5}{y}$	$\frac{3}{8p^2r}+\frac{5}{4p^2r}$
A) $\frac{a+8bc^2}{22b}$ B) $\frac{35a+8bc}{20b^2}$ C) $\frac{35a+8bc^2}{20b}$ D) $\frac{35a-8c^2}{20b}$	A) $\frac{2xz-21y^2}{18yz}$ B) $\frac{4xz-21y^2}{18yz}$ C) $\frac{2xz+21y^2}{18y^2z}$ D) $\frac{4xz-y^2}{18y^2z}$	A) $\frac{5x-3y}{xy}$ B) $\frac{5x+3y}{xy}$ C) $\frac{5x-3y}{x^2y}$ D) $\frac{5x+3y}{xy^2}$	A) $\frac{13}{8p^2r}$ B) $\frac{12}{8p^2r}$ C) $\frac{12}{8pr}$ D) $\frac{13}{8p^2r^2}$

Simplify each expression.

$\frac{2x+1}{x^2+2x-15}-\frac{7}{5x-15}$	$\frac{3x}{4x^2+4}-\frac{2x^2}{x^4-1}$	$\frac{3t}{2-x}+\frac{5}{x-2}$	$\frac{n}{n-3}+\frac{2n+2}{n^2-2n-3}$
A) $\frac{3x-30}{5(x-3)(x+5)}$ B) $\frac{3x+30}{(x-3)(x+5)}$ C) $\frac{3x-30}{(x+3)(x+5)}$ D) $\frac{3x-30}{5(x-3)(x-5)}$	A) $\frac{3x^3-8x^2}{4(x^2+1)(x^2-1)}$ B) $\frac{3x^3-8x^2}{4(x+1)(x-1)}$ C) $\frac{3x^3-8x^2-3x}{4(x+1)(x-1)}$ D) $\frac{3x^3-8x^2-3x}{4(x^2+1)(x^2-1)}$	A) $\frac{5-3t}{x-2}$ B) $\frac{5+3t}{x-2}$ C) $\frac{3+5t}{x+2}$ D) $\frac{3-5t}{x-2}$	A) $\frac{n+2}{n+3}$ B) $\frac{n-2}{n-3}$ C) $\frac{n+2}{n-3}$ D) $\frac{n-2}{n+3}$

Key Concept • Reciprocal Functions

Parent function	$f(x) = \frac{1}{x}$
Type of graph	hyperbola
Domain and range	all nonzero real numbers
Asymptotes	$x = 0$ and $f(x) = 0$
Intercepts	none
Not defined	$x = 0$



What is the parent reciprocal function?	What type of graph does $f(x) = \frac{1}{x}$ produce?	Which value is NOT in the domain of $f(x) = \frac{1}{x}$?	Which value is NOT in the range of $f(x) = \frac{1}{x}$?
$A)\ x^2$ $B)\ \frac{1}{x}$ $C)\ \lvert x\rvert$ $D)\ \sqrt{x}$	$A)$ Parabola $B)$ Circle $C)$ Hyperbola $D)$ Line	$A)\ 3$ $B)\ \frac{1}{3}$ $C)\ 2$ $D)\ 0$	$A)\ 3$ $B)\ \frac{1}{3}$ $C)\ 2$ $D)\ 0$

Key Concept • Reciprocal Functions

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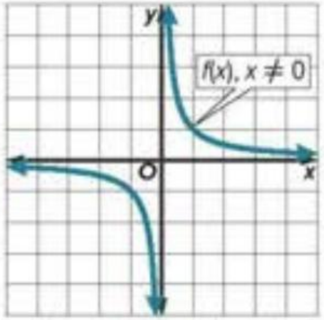
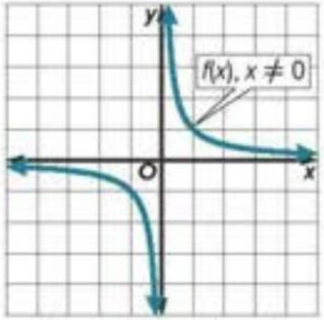


What is the vertical asymptote of $f(x) = \frac{1}{x}$?	What is the horizontal asymptote of $f(x) = \frac{1}{x}$?	Which statement is true about the x-intercept of $f(x) = \frac{1}{x}$?	Which statement is true about the y-intercept of $f(x) = \frac{1}{x}$?
$A)\ x = 0$ $B)\ y = 1$ $C)\ y = 0$ $D)\ x = 1$	$A)\ x = 0$ $B)\ y = 1$ $C)\ y = 0$ $D)\ x = 1$	$A)$ One x-intercept $B)$ Two x-intercepts $C)$ Infinitely many x-intercepts $D)$ None	$A)$ One y-intercept $B)$ Two y-intercepts $C)$ Infinitely many y-intercepts $D)$ None

Key Concept • Reciprocal Functions

Parent function	$f(x) = \frac{1}{x}$
Type of graph	hyperbola
Domain and range	all nonzero real numbers
Asymptotes	$x = 0$ and $f(x) = 0$
Intercepts	none
Not defined	$x = 0$



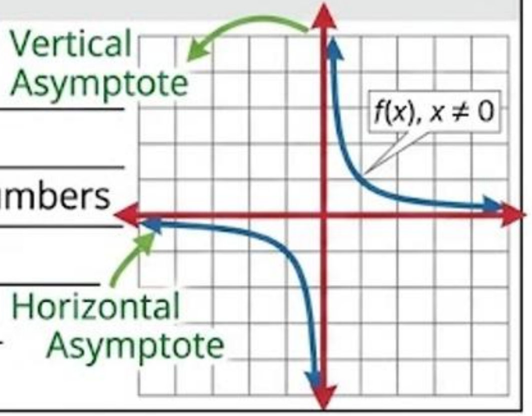
In which quadrants does the graph of $f(x) = \frac{1}{x}$ lie?	What happens to $f(x) = \frac{1}{x}$ as $x \to \infty$?	What happens to $f(x) = \frac{1}{x}$ as $x \to 0^+$?	Which statement is true about the domain and range?
$A)$ I and II $B)$ II and III $C)$ I and III $D)$ III and IV	$A)\ f(x) \to \infty$ $B)\ f(x) \to 0$ $C)\ f(x) \to 1$ $D)\ f(x) \to -\infty$	$A)\ f(x) \to \infty$ $B)\ f(x) \to 0$ $C)\ f(x) \to 1$ $D)\ f(x) \to -\infty$	$A)$ Domain includes 0 $B)$ Range includes 0 $C)$ Both exclude 0 $D)$ Both include 0

Determine the values of x for which $f(x)$ is undefined.

$f(x) = \frac{2}{-2x+5}$	$f(x) = \frac{-12}{-3x-7}$	$f(x) = \frac{5}{x}$	$f(x) = \frac{10}{x-3}$
$A)\ x = \frac{5}{2}$ $B)\ x = 3$ $C)\ x = 0$ $D)\ x = -\frac{7}{3}$	$A)\ x = \frac{5}{2}$ $B)\ x = 3$ $C)\ x = 0$ $D)\ x = -\frac{7}{3}$	$A)\ x = \frac{5}{2}$ $B)\ x = 3$ $C)\ x = 0$ $D)\ x = -\frac{7}{3}$	$A)\ x = \frac{5}{2}$ $B)\ x = 3$ $C)\ x = 0$ $D)\ x = -\frac{7}{3}$

Key Concept • Reciprocal Functions

Parent function	$f(x) = \frac{1}{x}$
Type of graph	hyperbola
Domain and range	all nonzero real numbers
Asymptotes	$x = 0$ and $f(x) = 0$
Intercepts	none
Not defined	$x = 0$



$$g(x) = \frac{a}{x - h} + k$$

Reflected about **x-axis** $-f(x)$

Dilation Vertically
Expand (Stretch) $|a| > 1$
Compress $0 < |a| < 1$

Horizontal translation
(+) shift Left
(−) shift Right
(vertical asymptote)

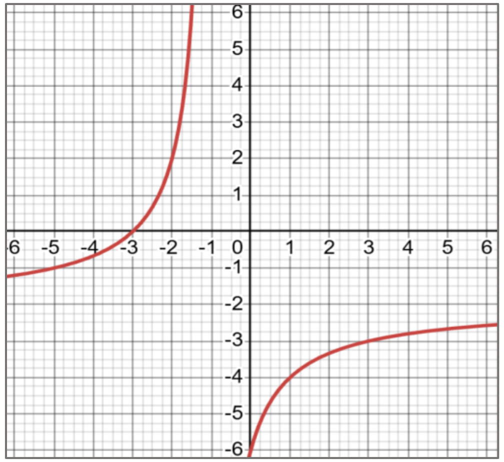
Vertical translation
(+) shift UP
(−) shift Down
(horizontal asymptote)

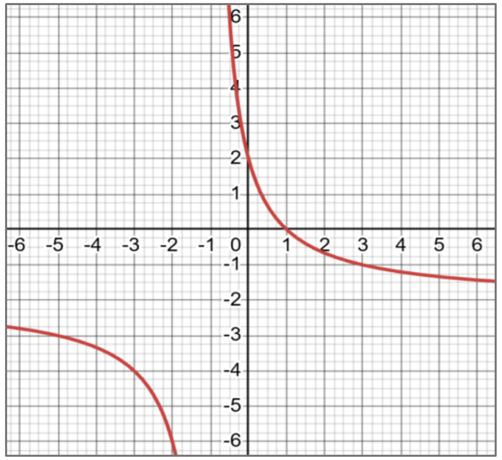
Horizontal asymptote: For $f(x) = \frac{n}{b(x)}$, the horizontal asymptote is $f(x) = 0$. For a reciprocal function of the form $f(x) = \frac{n}{b(x)} + k$, where k is a constant, the horizontal asymptote is $f(x) = k$.

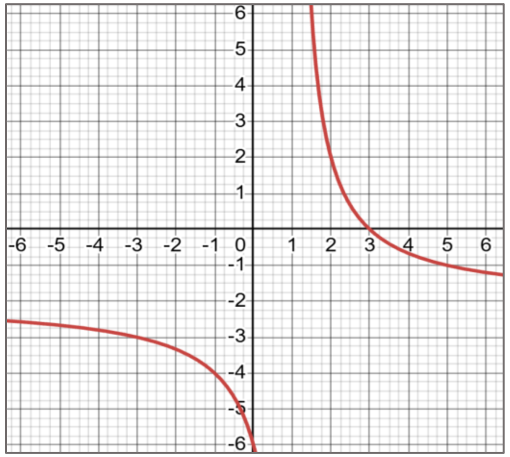
Vertical asymptote: For $f(x) = \frac{n}{b(x)}$, the vertical asymptote is found where $b(x) = 0$. For example, for $f(x) = \frac{1}{x}$, the vertical asymptote is $x = 0$.

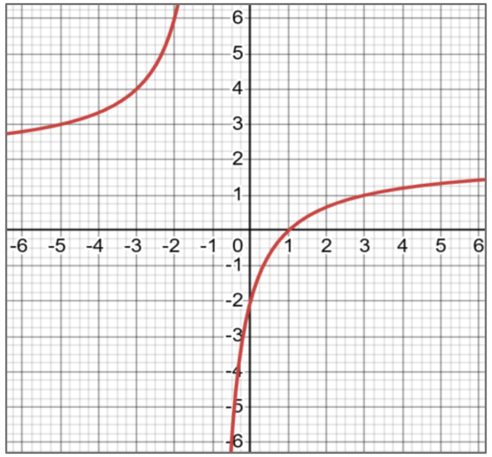
Graph $g(x) = \frac{-4}{x+1} - 2$. State the domain and range.

Graph

A)


B)


C)


D)


Transformations

$A)$ $a = -4$, reflected about x-axis and stretched vertically.
$h = -1$, translated left 1 unit
$k = -2$, translated down 2 units

$B)$ $a = -4$, reflected about x-axis and compressed vertically.
$h = 1$, translated left 1 unit
$k = -2$, translated down 2 units

$C)$ $a = -4$, reflected about x-axis and compressed vertically.
$h = 1$, translated right 1 unit
$k = -2$, translated up 2 units

$D)$ $a = -4$, reflected about x-axis and stretched vertically.
$h = 1$, translated right 1 unit
$k = -2$, translated down 2 units

Domain and Range

$A)$ Domain $\{x \mid x \neq 2\}$
Range $\{y \mid y \neq -1\}$

$B)$ Domain $\{x \mid x \neq -1\}$
Range $\{y \mid y \neq 2\}$

$C)$ Domain $\{x \mid x \neq -1\}$
Range $\{y \mid y \neq -2\}$

$D)$ Domain $\{x \mid x \neq -2\}$
Range $\{y \mid y \neq -1\}$

Vertical and Horizontal Asymptotes

$A)$ V.A: $x = 2$
H.A $y = -1$

$B)$ V.A: $x = -1$
H.A $y = -2$

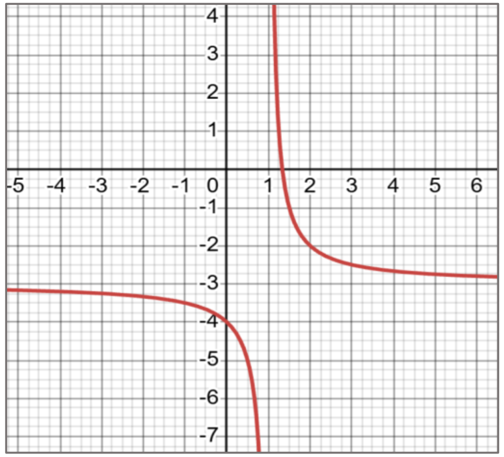
$C)$ V.A: $x = -1$
H.A $y = 2$

$D)$ V.A: $x = -2$
H.A $y = -1$

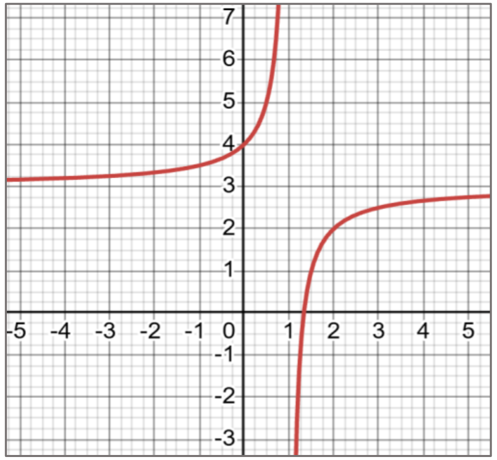
Graph $g(x) = \frac{1}{x-1} + 3$.

Graph

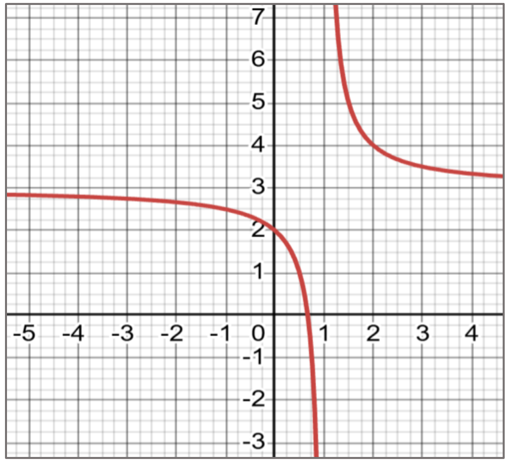
A)



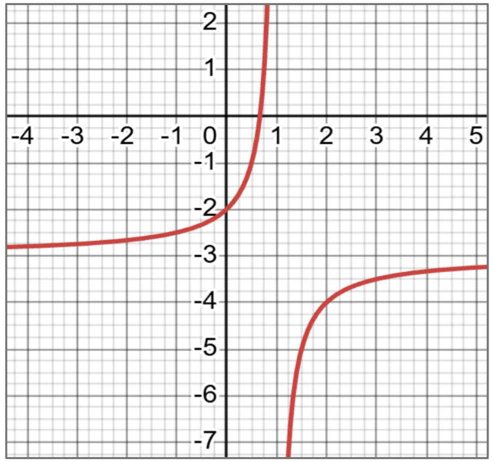
B)



C)



D)



	Transformations	Domain and Range
$A)$	$h = -1$, translated left 1 unit $k = -3$, translated down 3 units	Domain $\{x \mid x \neq 1\}$ Range $\{y \mid y \neq 3\}$
$B)$	$h = 1$, translated left 1 unit $k = 3$, translated down 3 units	Domain $\{x \mid x \neq -1\}$ Range $\{y \mid y \neq 3\}$
$C)$	$h = 1$, translated right 1 unit $k = 3$, translated up 3 units	Domain $\{x \mid x \neq -1\}$ Range $\{y \mid y \neq -3\}$
$D)$	$h = 1$, translated right 1 unit $k = -3$, translated down 3 units	Domain $\{x \mid x \neq 3\}$ Range $\{y \mid y \neq -1\}$

Vertical and Horizontal Asymptotes

$A)$ V.A: $x = 3$
H.A $y = 1$

$B)$ V.A: $x = 1$
H.A $y = 3$

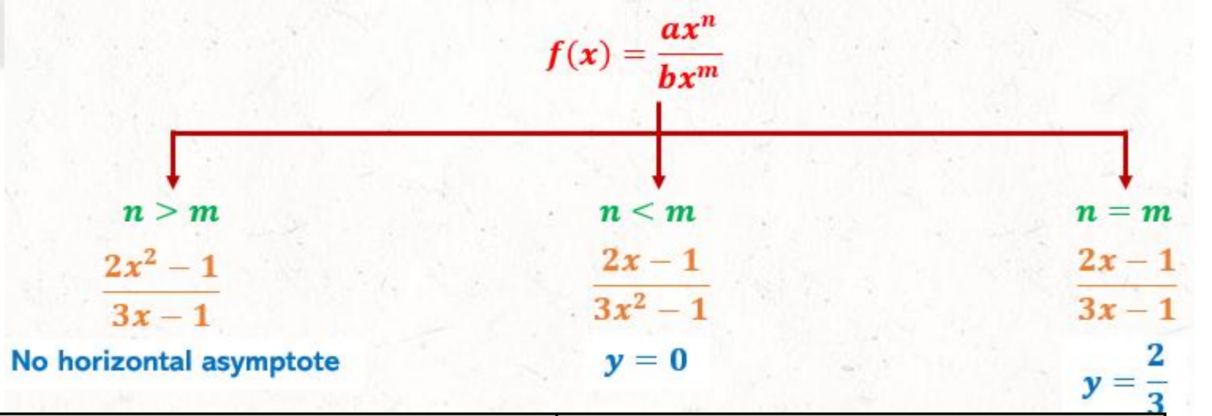
$C)$ V.A: $x = -1$
H.A $y = 3$

$D)$ V.A: $x = 3$
H.A $y = -1$

Key Concept • Vertical and Horizontal Asymptotes

If $f(x) = \frac{a(x)}{b(x)}$, $a(x)$ and $b(x)$ are polynomial functions with no common factors other than 1, and $b(x) \neq 0$, then:

- $f(x)$ has a vertical asymptote whenever $b(x) = 0$.
- $f(x)$ has at most one horizontal asymptote.



For a rational function $f(x) = \frac{a(x)}{b(x)}$, a vertical asymptote occurs when:	How many horizontal asymptotes can a rational function have at most?	If the degree of the numerator is less than the degree of the denominator, the horizontal asymptote is:	If the degree of the numerator is greater than the degree of the denominator, then:
$A)\ a(x) = 0$ $B)\ b(x) = 0$ $C)\ a(x) = b(x)$ $D)$ Degree of numerator is greater	$A)$ None $B)$ One $C)$ Two $D)$ Infinite	$A)\ x = 0$ $B)\ y = 1$ $C)\ y = 0$ $D)$ No horizontal asymptote	$A)\ x = 0$ $B)\ y = 1$ $C)\ y = 0$ $D)$ No horizontal asymptote

Key Concept • Vertical and Horizontal Asymptotes

If $f(x) = \frac{a(x)}{b(x)}$, $a(x)$ and $b(x)$ are polynomial functions with no common factors other than 1, and $b(x) \neq 0$, then:

- $f(x)$ has a vertical asymptote whenever $b(x) = 0$.
- $f(x)$ has at most one horizontal asymptote.

$$f(x) = \frac{ax^n}{bx^m}$$

- $n > m$: $\frac{2x^2 - 1}{3x - 1}$ — No horizontal asymptote
- $n < m$: $\frac{2x - 1}{3x^2 - 1}$ — $y = 0$
- $n = m$: $\frac{2x - 1}{3x - 1}$ — $y = \frac{2}{3}$

If the degree of the numerator equals the degree of the denominator, the horizontal asymptote is:	Find the horizontal asymptote of $f(x) = \frac{3x^2+1}{5x^2-2}$	Find the horizontal asymptote of $f(x) = \frac{2x+1}{x^3-4}$	Find the horizontal asymptote of $f(x) = \frac{x^4+2}{3x^2+1}$
$A)$ Ratio of leading coefficients $B)$ Product of leading coefficients $C)$ $y = 0$ $D)$ No asymptote	$A)$ $y = 0$ $B)$ $y = \frac{5}{3}$ $C)$ $y = \frac{3}{5}$ $D)$ No horizontal asymptote	$A)$ $y = 0$ $B)$ $y = \frac{5}{3}$ $C)$ $y = \frac{3}{5}$ $D)$ No horizontal asymptote	$A)$ $y = 0$ $B)$ $y = \frac{5}{3}$ $C)$ $y = \frac{3}{5}$ $D)$ No horizontal asymptote

Key Concept • Vertical and Horizontal Asymptotes

If $f(x) = \frac{a(x)}{b(x)}$, $a(x)$ and $b(x)$ are polynomial functions with no common factors other than 1, and $b(x) \neq 0$, then:

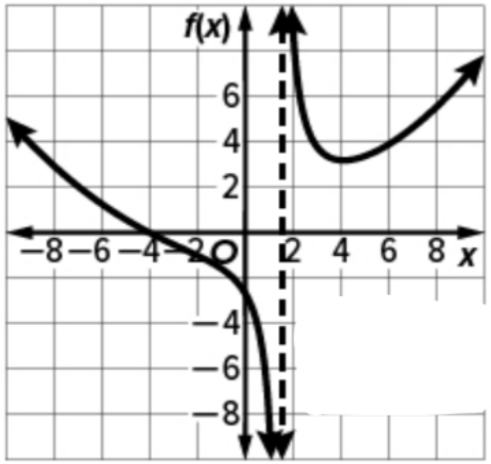
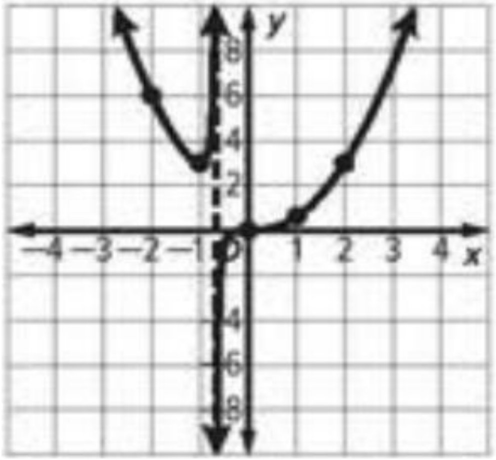
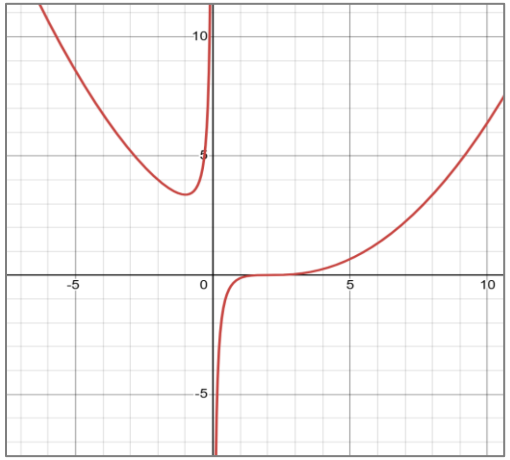
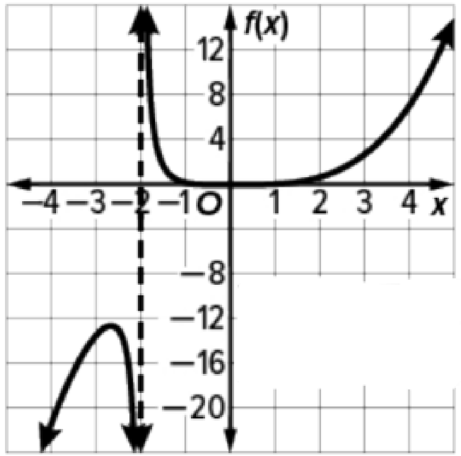
- $f(x)$ has a vertical asymptote whenever $b(x) = 0$.
- $f(x)$ has at most one horizontal asymptote.

$$f(x) = \frac{ax^n}{bx^m}$$

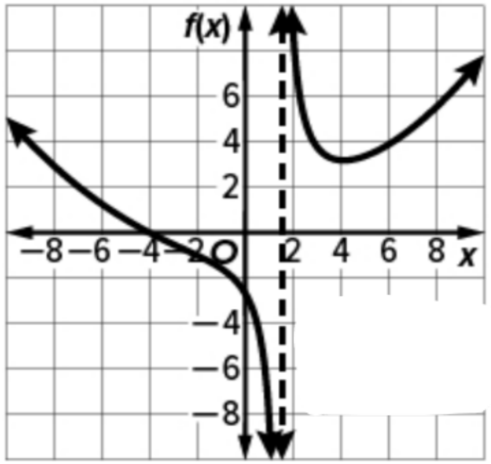
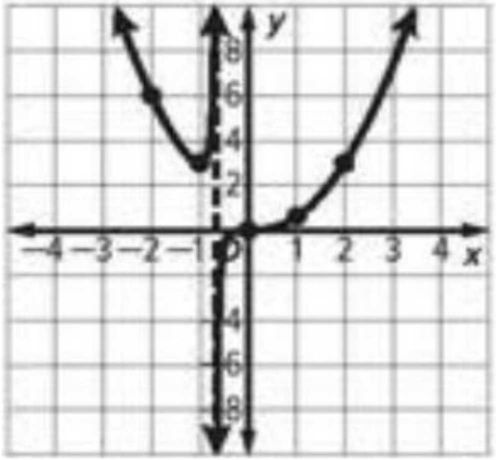
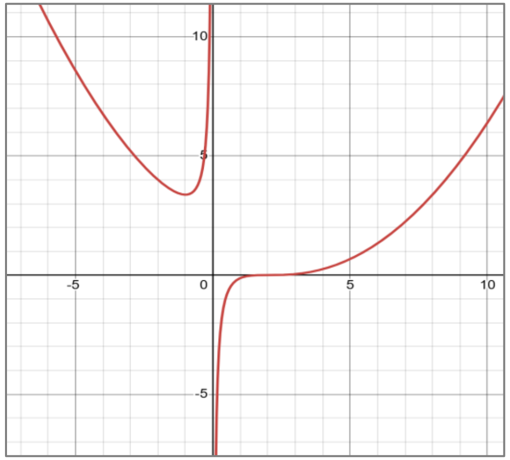
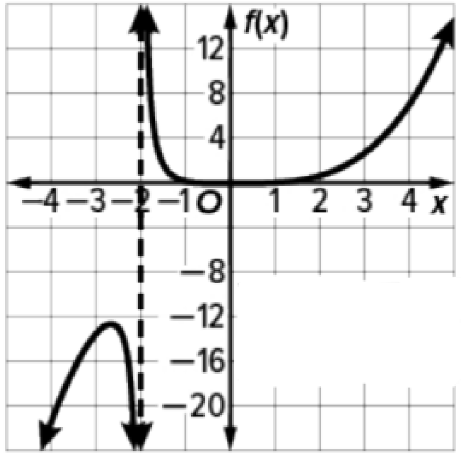
- $n > m$: $\frac{2x^2 - 1}{3x - 1}$ — No horizontal asymptote
- $n < m$: $\frac{2x - 1}{3x^2 - 1}$ — $y = 0$
- $n = m$: $\frac{2x - 1}{3x - 1}$ — $y = \frac{2}{3}$

What is the vertical asymptote of $f(x) = \frac{1}{x-4}$	What is the vertical asymptote of $f(x) = \frac{x+1}{x^2-9}$	Which function has horizontal asymptote $y = 1$	Which function has no horizontal asymptote?
$A)\ y = 4$	$A)\ y = 4$	$A)\ \frac{x+1}{x+2}$	$A)\ \frac{2x+1}{x^2+3}$
$B)\ x = 3$	$B)\ x = 3$	$B)\ \frac{1}{x}$	$B)\ \frac{x^3+1}{x+2}$
$C)\ x = \pm 3$	$C)\ x = \pm 3$	$C)\ \frac{x}{x^2+1}$	$C)\ \frac{x^2}{x^2+1}$
$D)\ y = 0$	$D)\ y = 0$	$D)\ \frac{x^3}{x-1}$	$D)\ \frac{5}{x}$

Graph $f(x) = \dfrac{x^3}{x + \frac{2}{3}}$

Graph	Find zeros	Find the asymptotes
$A)$  $B)$  $C)$  $D)$ 	$A)\ x = 3$ $B)\ x = \frac{2}{3}$ $C)\ x = -\frac{2}{3}$ $D)\ x = 0$	$A)$ V.A: $x = -\frac{2}{3}$ H.A: none $B)$ V.A: $x = -\frac{2}{3}$ H.A $y = 0$ $C)$ V.A: $x = \frac{2}{3}$ H.A: none $D)$ V.A: $x = 0$ H.A $y = 1$

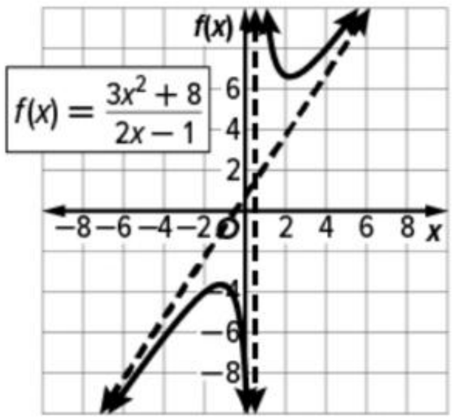
Consider $g(x) = \dfrac{(0.5x-1)^3}{x}$

Graph	Find zeros	Find the asymptotes
$A)$ 	$A)\ x = 0.5$	$A)$ V.A: $x = 0$ H.A: none
$B)$ 	$B)\ x = 1$	$B)$ V.A: $x = 0$ H.A $y = 0$
$C)$ 	$C)\ x = -0.5$	$C)$ V.A: $x = 2$ H.A: none
$D)$ 	$D)\ x = 2$	$D)$ V.A: $x = 2$ H.A $y = 0.5$

An **oblique asymptote**, or slant asymptote, is neither horizontal nor vertical.

Key Concept • Oblique Asymptotes

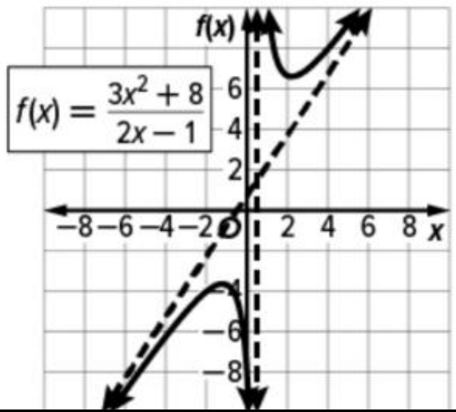
If $f(x) = \frac{a(x)}{b(x)}$, where $a(x)$ and $b(x)$ are polynomial functions with no common factors other than 1 and $b(x) \neq 0$, then $f(x)$ has an oblique asymptote if the degree of $a(x)$ minus the degree of $b(x)$ equals 1. The equation of the asymptote is $f(x) = \frac{a(x)}{b(x)}$ with no remainder.



What is another name for an oblique asymptote?	An oblique asymptote is:	A rational function has an oblique asymptote when:	Which function has an oblique asymptote?
A) Vertical asymptote B) Horizontal asymptote C) Slant asymptote D) Curved asymptote	A) Vertical B) Horizontal C) Neither horizontal nor vertical D) Parabola	A) Degree of numerator – degree of denominator = 1 B) Degree of denominator is greater C) Degree of denominator – degree of numerator = 1 D) Degree of numerator = degree of denominator	A) $\frac{x^2-1}{x^2-4}$ B) $\frac{x^2+3x+1}{x+1}$ C) $\frac{x+2}{x^3+1}$ D) $\frac{5}{x-2}$

11	تمثيل الدوال النسبية ذات خط التقارب المائل ونقطة الانفصال بيانيا		
	Graph rational functions with oblique asymptotes and point discontinuity.	Key Concept • Oblique Asymptotes	340

An **oblique asymptote**, or slant asymptote, is neither horizontal nor vertical.



Key Concept • Oblique Asymptotes

If $f(x) = \frac{a(x)}{b(x)}$, where $a(x)$ and $b(x)$ are polynomial functions with no common factors other than 1 and $b(x) \neq 0$, then $f(x)$ has an oblique asymptote if the degree of $a(x)$ minus the degree of $b(x)$ equals 1.

The equation of the asymptote is $f(x) = \frac{a(x)}{b(x)}$ with no remainder.

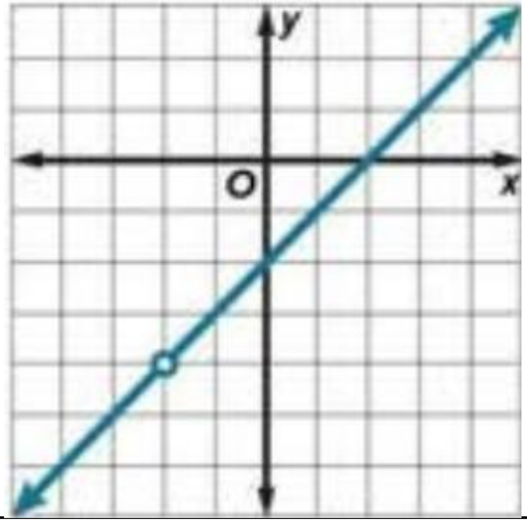
What method is used to find an oblique asymptote?	The equation of the oblique asymptote is:	Determine the type of asymptote for $f(x) = \frac{x^2+2}{x-2}$	If the degree of the numerator is 3 and the degree of the denominator is 2, the function has:
$A)$ Long/ Synthetic division $B)$ Graphing only $C)$ Factoring $D)$ Substitution	$A)$ The remainder only $B)$ The denominator $C)$ The x-intercept $D)$ The quotient without the remainder	$A)$ Horizontal $B)$ Oblique $C)$ Vertical $D)$ None	$A)$ A vertical asymptote $B)$ An oblique asymptote $C)$ A horizontal asymptote $D)$ No asymptote

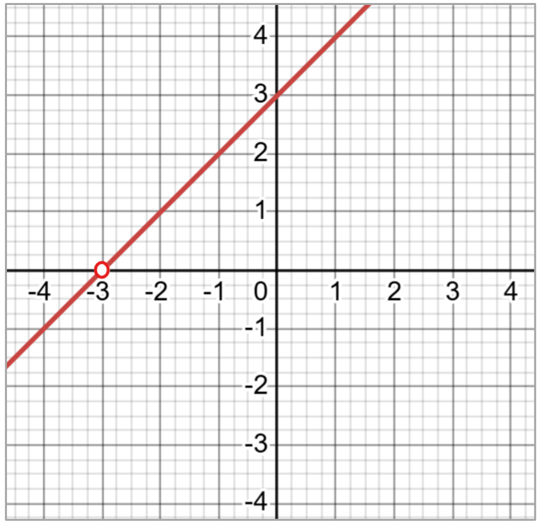
Key Concept • Point Discontinuity

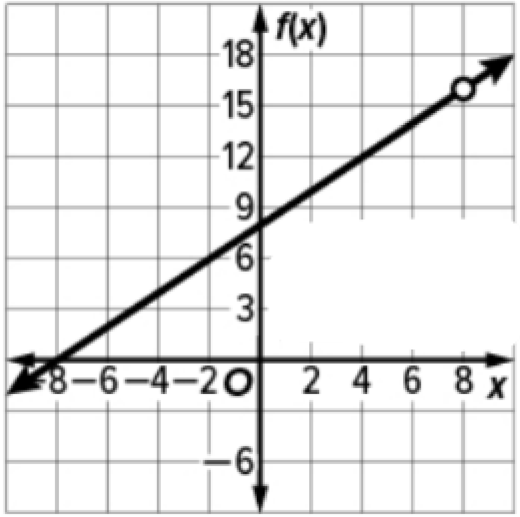
If $f(x) = \frac{a(x)}{b(x)}$, $b(x) \neq 0$, and $x - c$ is a factor of both $a(x)$ and $b(x)$, then there is a point discontinuity at $x = c$.

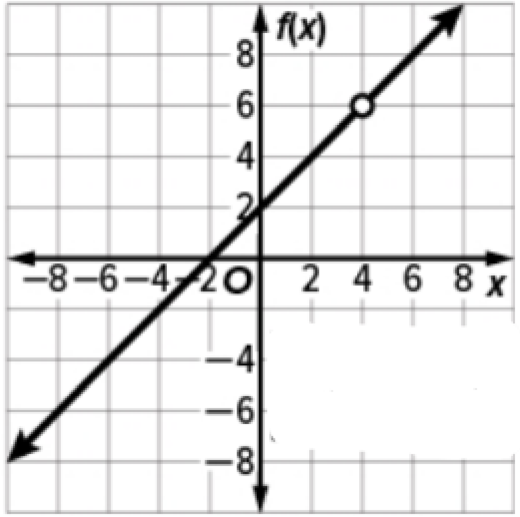
Graph each function. Find the point discontinuity.

$f(x) = \frac{x^2 - 4}{x + 2}$	$f(x) = \frac{(x + 3)^2}{x + 3}$	$f(x) = \frac{x^2 - 2x - 8}{x - 4}$	$f(x) = \frac{x^2 - 64}{x - 8}$
$A)\ x = -3$	$A)\ x = -3$	$A)\ x = -3$	$A)\ x = -3$
$B)\ x = 4$	$B)\ x = 4$	$B)\ x = 4$	$B)\ x = 4$
$C)\ x = -2$	$C)\ x = -2$	$C)\ x = -2$	$C)\ x = -2$
$D)\ x = 8$	$D)\ x = 8$	$D)\ x = 8$	$D)\ x = 8$









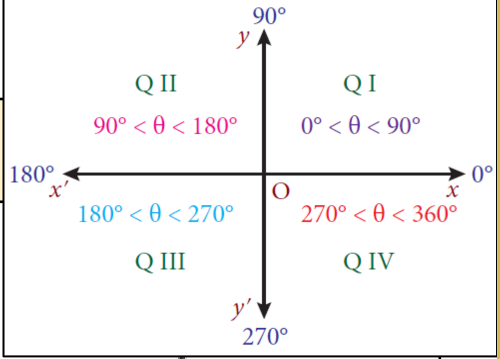
Solve each equation. Check your solutions.

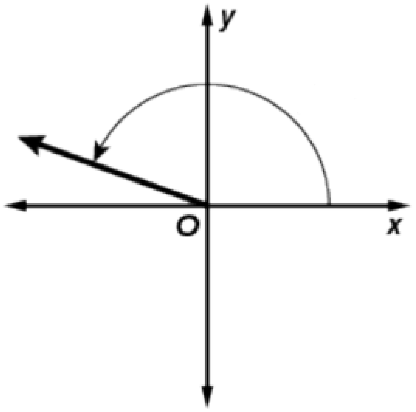
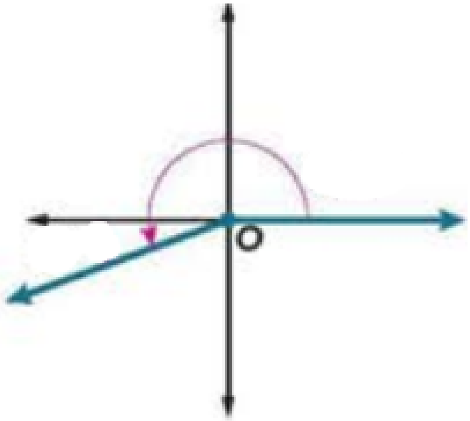
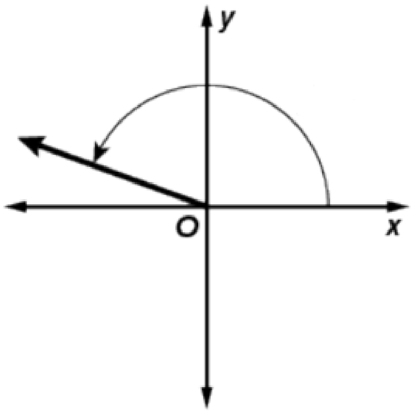
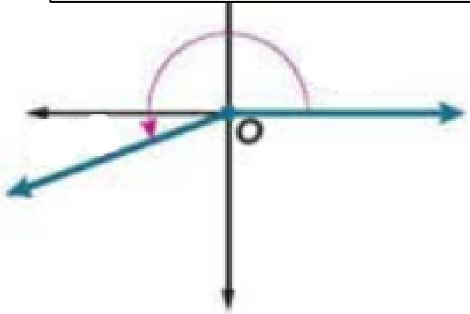
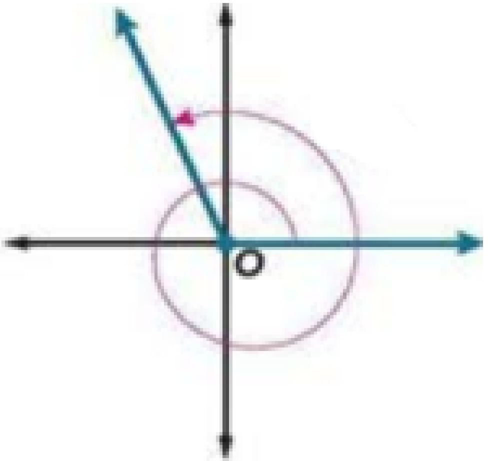
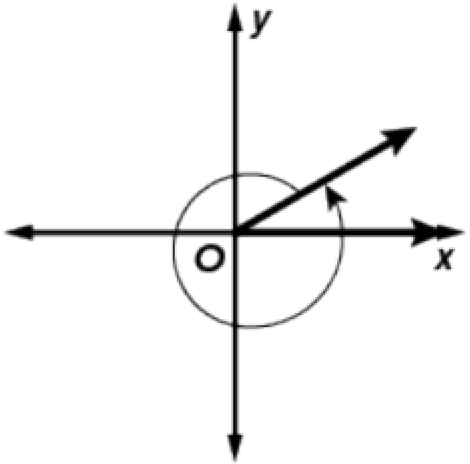
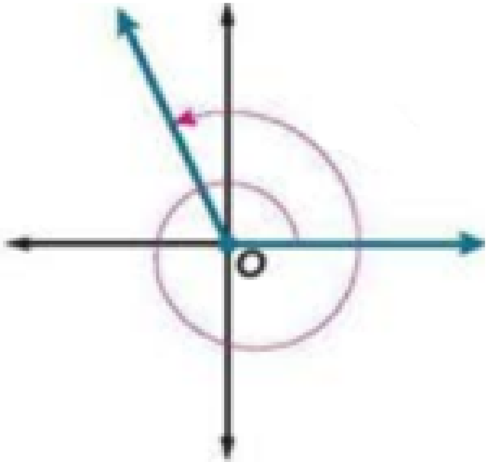
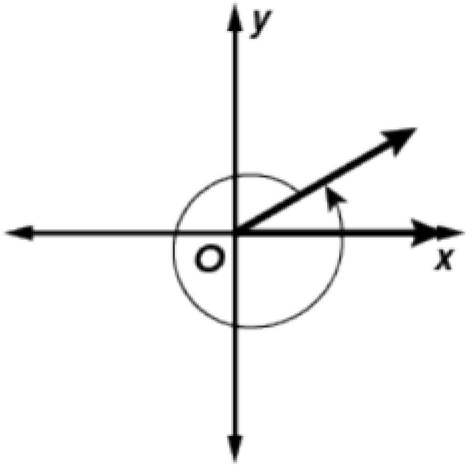
$\frac{7}{12}+\frac{9}{x-4}=\frac{55}{48}$	$\frac{5}{6}-\frac{2}{4x+1}=\frac{x}{3}$	$\frac{14}{x-2}-\frac{18}{x+1}=\frac{22}{x^2-x-2}$	$\frac{2}{a+2}+\frac{10}{a+5}=\frac{36}{a^2+7a+10}$
$A)\ x=\frac{1}{2}$ and $\frac{7}{4}$ $B)\ x=20$ $C)\ x=7$ $D)\ x=\frac{1}{2}$	$A)\ x=\frac{1}{2}$ and $\frac{7}{4}$ $B)\ x=20$ $C)\ x=7$ $D)\ x=\frac{1}{2}$	$A)\ x=\frac{1}{2}$ and $\frac{7}{4}$ $B)\ x=20$ $C)\ x=7$ $D)\ x=\frac{1}{2}$	$A)\ x=\frac{1}{2}$ and $\frac{7}{4}$ $B)\ x=20$ $C)\ x=7$ $D)\ x=\frac{1}{2}$

Solve each equation. Check your solutions.

$\frac{2m}{m-4} - \frac{m^2+7m+4}{3m^2-18m+24} = \frac{4m}{3m-6}$	$\frac{3x}{x-4} - \frac{x^2-7x-4}{x^2-16} = \frac{5}{x+4}$	$\frac{x}{2x-1} + \frac{3}{x+4} = \frac{21}{2x^2+7x-4}$	$\frac{2}{y-5} + \frac{y-1}{2y+1} = \frac{2}{2y^2-9y-5}$
$A)\ x = 1$ $B)\ x = 4$ $C)\ x = -1$ $D)\ x = -1$ and 4	$A)\ x = -3$ $B)\ x = -4$ $C)\ x = -3$ and -4 $D)\ x = 3$	$A)\ x = -2$ $B)\ x = -12$ and -2 $C)\ x = -12$ $D)\ x = 2$	$A)\ x = -5$ $B)\ x = 5$ $C)\ x = 2$ $D)\ \emptyset$

Draw an angle with the given measure in standard position.



200°	475°
A)  B) 	A)  B) 
C)  D) 	C)  D) 

An angle of 200° in standard position has its terminal side in:	An angle of 475° in standard position has its terminal side in:	An angle of -400° in standard position has its terminal side in:	An angle of -320° in standard position rotates:
$A)$ Quadrant I $B)$ Quadrant II $C)$ Quadrant III $D)$ Quadrant IV	$A)$ Quadrant I $B)$ Quadrant II $C)$ Quadrant III $D)$ Quadrant IV	$A)$ Quadrant I $B)$ Quadrant II $C)$ Quadrant III $D)$ Quadrant IV	$A)$ Quadrant I $B)$ Quadrant II $C)$ Quadrant III $D)$ Quadrant IV
An angle of 200° in standard position rotates:	**An angle of 475° in standard position rotates:**	**An angle of -400° in standard position rotates:**	**An angle of -320° in standard position rotates:**
$A)$ 475° counterclockwise $B)$ 475° clockwise $C)$ 200° clockwise $D)$200° counterclockwise	$A)$ 475° counterclockwise $B)$ 475° clockwise $C)$ 200° clockwise $D)$200° counterclockwise	$A)$ -320° counterclockwise $B)$ -400° clockwise $C)$ -320° clockwise $D)$ -400° counterclockwise	$A)$ -320° counterclockwise $B)$ -400° clockwise $C)$ -320° clockwise $D)$ -400° counterclockwise

Find a positive coterminal angle for 35°.	Find a negative coterminal angle for 35°.	Find a positive coterminal angle for -50°.	Find a negative coterminal angle for -50°.
$A)$ -325° $B)$ 395° $C)$ 310° $D)$ -410°	$A)$ -325° $B)$ 395° $C)$ 310° $D)$ -410°	$A)$ -325° $B)$ 395° $C)$ 310° $D)$ -410°	$A)$ -325° $B)$ 395° $C)$ 310° $D)$ -410°
A 450° angle is coterminal with:	A -210° angle is coterminal with:	Which angle is coterminal with 810°?	Which angle is coterminal with 1110°?
$A)$ 30° $B)$ 90° $C)$ 150° $D)$ 270°	$A)$ 30° $B)$ 90° $C)$ 150° $D)$ 270°	$A)$ 30° $B)$ 90° $C)$ 150° $D)$ 270°	$A)$ 30° $B)$ 90° $C)$ 150° $D)$ 270°

Key Concept • Convert Between Degrees and Radians

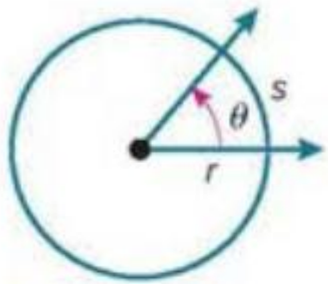
Degrees to Radians	Radians to Degrees
To convert a degree measure to radians, multiply the number of degrees by $\frac{\pi \text{ radians}}{180^\circ}$.	To convert a radian measure to degrees, multiply the number of radians by $\frac{180^\circ}{\pi \text{ radians}}$.

Rewrite -100° in radians	Rewrite -220° in radians	Rewrite $\frac{11\pi}{4}$ in degrees	Rewrite $\frac{7\pi}{6}$ in degrees
$A)\ -\frac{11\pi}{9}$ $B)\ \frac{11\pi}{9}$ $C)\ -\frac{5\pi}{9}$ $D)\ \frac{5\pi}{9}$	$A)\ -\frac{11\pi}{9}$ $B)\ \frac{11\pi}{9}$ $C)\ -\frac{5\pi}{9}$ $D)\ \frac{5\pi}{9}$	$A)$ 210° $B)$ 495° $C)$ 120° $D)$ 60°	$A)$ 210° $B)$ 495° $C)$ 120° $D)$ 60°

Key Concept • Arc Length

Words: For a circle with radius *r* and central angle θ (in radians), the arc length *s* equals the product of *r* and θ.

Symbols: $s = r\theta$

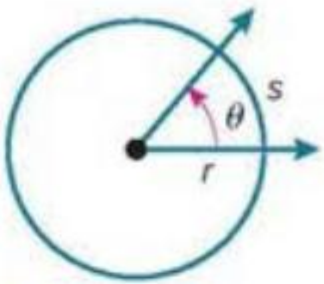


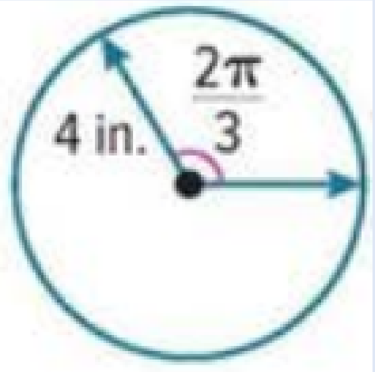
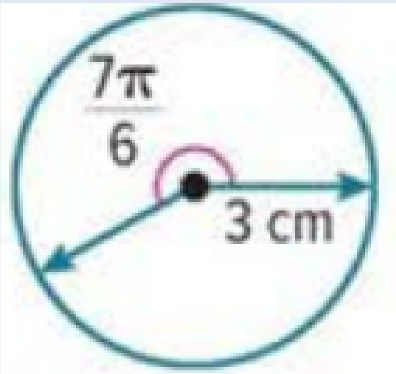
Which formula is used for arc length when θ is in radians?	A wheel has radius $10\ cm$ and rotates through $\frac{3\pi}{5}$ radians. Find s.	If $s = 15\pi$ cm and $r = 5\ cm$, what is θ in radians?
$A)$ s = rθ $B)$ $s = \pi r^2$ $C)$ s = 2πr $D)$ $s = \frac{\theta}{r}$	$A)$ 2π cm $B)$ 15π cm $C)$ 3π cm $D)$ 6π cm	$A)$ 2π cm $B)$ 15π cm $C)$ 3π cm $D)$ 6π cm

Key Concept • Arc Length

Words: For a circle with radius r and central angle θ (in radians), the arc length s equals the product of r and θ.

Symbols: $s = r\theta$

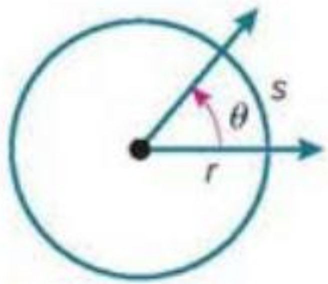


 	 	Find the arc length when $d = 12cm$ and $\theta = \frac{\pi}{3}$ radians.
$A)$ 12.4 in $B)$ 11.0 cm $C)$ 6.28 cm $D)$ 8.4 in.	$A)$ 12.4 in $B)$ 11.0 cm $C)$ 6.28 cm $D)$ 8.4 in.	$A)$ 12.4 in $B)$ 11.0 cm $C)$ 6.28 cm $D)$ 8.4 in.

Key Concept • Arc Length

Words: For a circle with radius r and central angle θ (in radians), the arc length s equals the product of r and θ.

Symbols: $s = r\theta$



A traffic circle, or roundabout, is a circular roadway at the intersection of two or more streets that allows cars to travel through more continuously than a traffic light or stop sign. The diameter of a traffic circle is 160 feet. How far does a car travel in the roundabout if it goes three-fourths of the way around?

A) 120 ft

B) 377 ft

C) 377 m

D) 120 m

Key Concept – Trigonometric Functions in Right Triangles

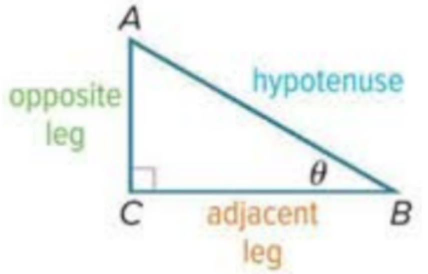
If θ is the measure of an acute angle of a right triangle, then the trigonometric functions involving the **opposite** side ***opp***, the **adjacent** side ***adj***, and the **hypotenuse** ***hyp*** are defined as follows.

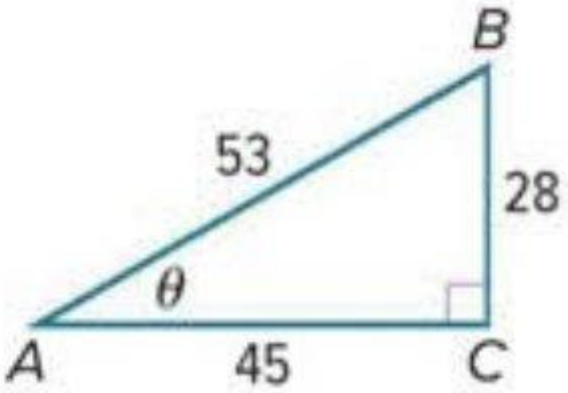
Reciprocal Functions

sine: $\sin\theta = \frac{opp}{hyp}$ **cosecant**: $\csc\theta = \frac{hyp}{opp}$

cosine: $\cos\theta = \frac{adj}{hyp}$ **secant**: $\sec\theta = \frac{hyp}{adj}$

tangent: $\tan\theta = \frac{opp}{adj}$ **cotangent**: $\cot\theta = \frac{adj}{opp}$





Find $\sin\theta$	Find $\cos\theta$	Find $\tan\theta$
A) $\frac{28}{53}$ B) $\frac{28}{45}$ C) $\frac{53}{45}$ D) $\frac{45}{53}$	A) $\frac{28}{53}$ B) $\frac{28}{45}$ C) $\frac{53}{45}$ D) $\frac{45}{53}$	A) $\frac{28}{53}$ B) $\frac{28}{45}$ C) $\frac{53}{45}$ D) $\frac{45}{53}$

Key Concept – Trigonometric Functions in Right Triangles

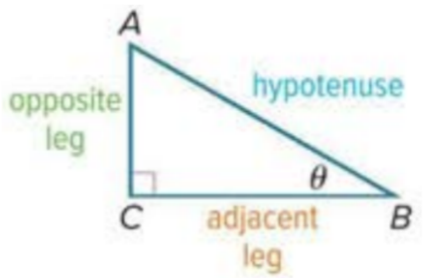
If θ is the measure of an acute angle of a right triangle, then the trigonometric functions involving the **opposite** side ***opp***, the **adjacent** side ***adj***, and the **hypotenuse** ***hyp*** are defined as follows.

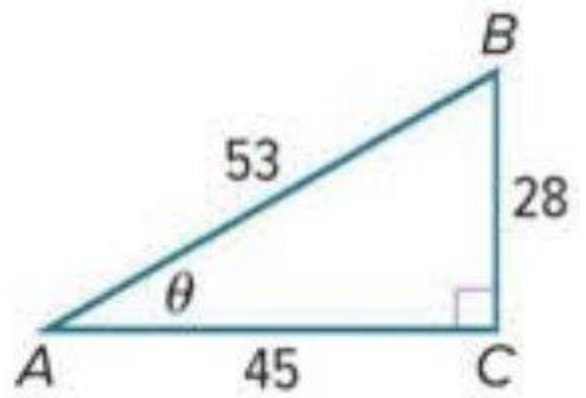
Reciprocal Functions

sine: $\sin\theta = \frac{opp}{hyp}$ | **cosecant**: $\csc\theta = \frac{hyp}{opp}$

cosine: $\cos\theta = \frac{adj}{hyp}$ | **secant**: $\sec\theta = \frac{hyp}{adj}$

tangent: $\tan\theta = \frac{opp}{adj}$ | **cotangent**: $\cot\theta = \frac{adj}{opp}$





Find $csc\,\theta$	Find $sec\,\theta$	Find $cot\,\theta$
$A)\ \frac{45}{28}$ $B)\ \frac{28}{45}$	$A)\ \frac{45}{28}$ $B)\ \frac{28}{45}$	$A)\ \frac{45}{28}$ $B)\ \frac{28}{45}$
$C)\ \frac{53}{28}$ $D)\ \frac{53}{45}$	$C)\ \frac{53}{28}$ $D)\ \frac{53}{45}$	$C)\ \frac{53}{28}$ $D)\ \frac{53}{45}$

19	إيجاد قيم النسب المثلثية		
	Find values of trigonometric ratios.	Example 1	425

Key Concept – Trigonometric Functions in Right Triangles

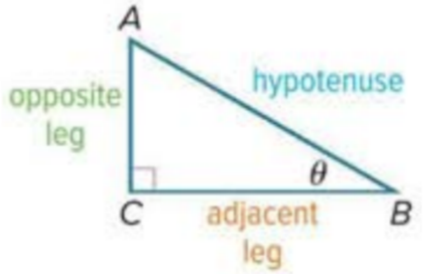
If θ is the measure of an acute angle of a right triangle, then the trigonometric functions involving the **opposite** side ***opp***, the **adjacent** side ***adj***, and the **hypotenuse** ***hyp*** are defined as follows.

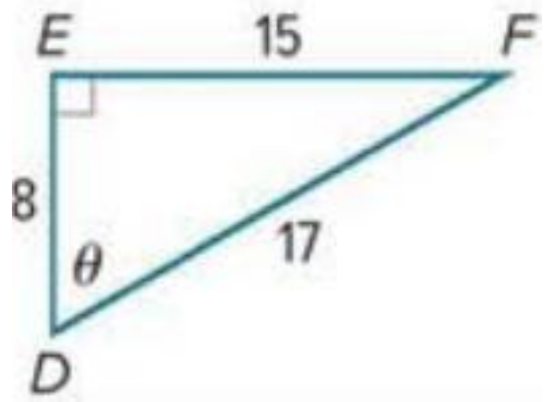
Reciprocal Functions

sine: $\sin\theta = \frac{\text{opp}}{\text{hyp}}$ — **cosecant**: $\csc\theta = \frac{\text{hyp}}{\text{opp}}$

cosine: $\cos\theta = \frac{\text{adj}}{\text{hyp}}$ — **secant**: $\sec\theta = \frac{\text{hyp}}{\text{adj}}$

tangent: $\tan\theta = \frac{\text{opp}}{\text{adj}}$ — **cotangent**: $\cot\theta = \frac{\text{adj}}{\text{opp}}$





Find $\sin\theta$	Find $cos\,\theta$	Find $tan\,\theta$
$A)\ \frac{15}{8}$ $B)\ \frac{15}{17}$ $C)\ \frac{8}{17}$ $D)\ \frac{8}{15}$	$A)\ \frac{15}{8}$ $B)\ \frac{15}{17}$ $C)\ \frac{8}{17}$ $D)\ \frac{8}{15}$	$A)\ \frac{15}{8}$ $B)\ \frac{15}{17}$ $C)\ \frac{8}{17}$ $D)\ \frac{8}{15}$

Key Concept – Trigonometric Functions in Right Triangles

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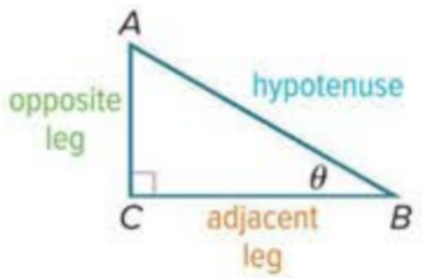
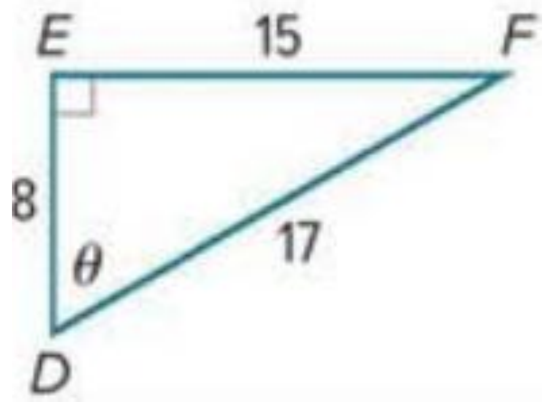
tangent: $\tan\theta = \frac{\text{opp}}{\text{adj}}$ — **cotangent**: $\cot\theta = \frac{\text{adj}}{\text{opp}}$



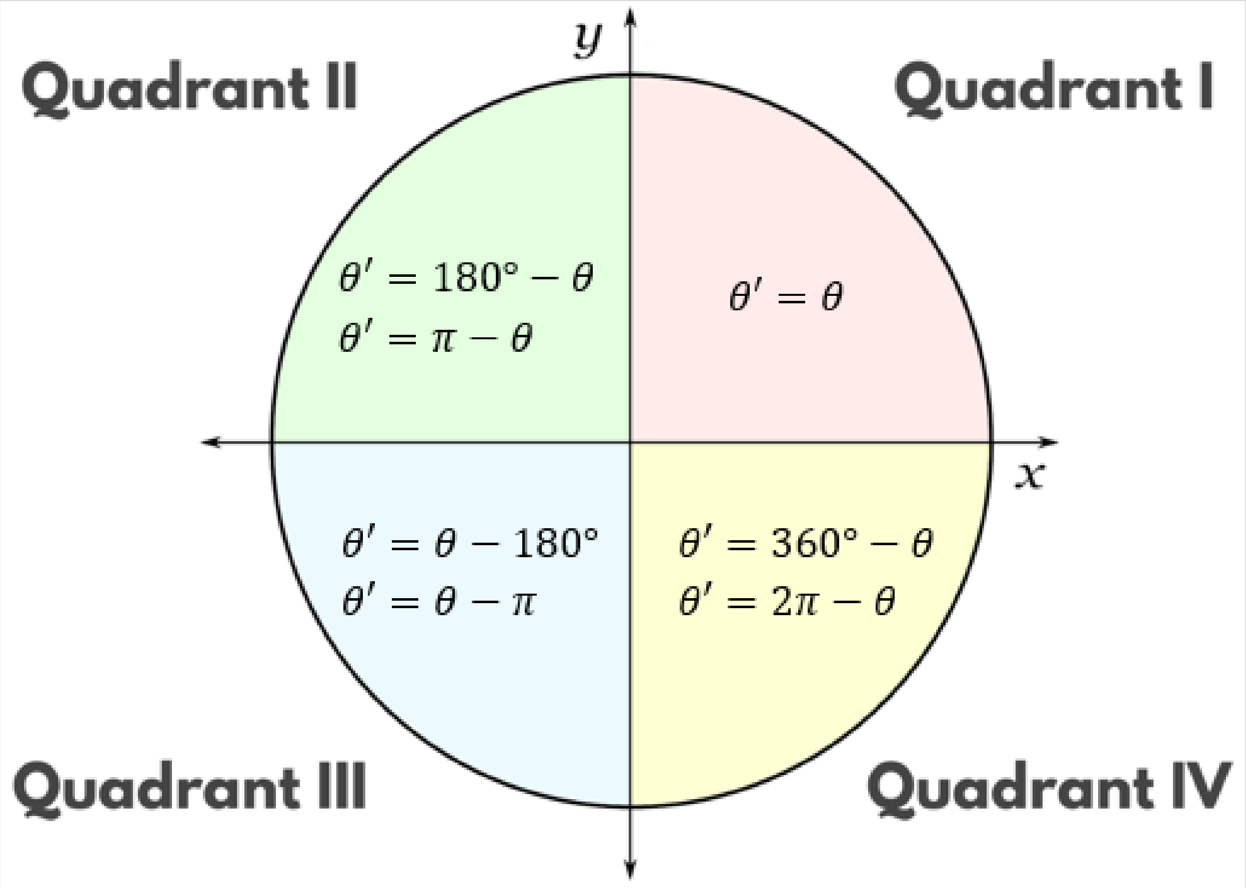


Find $csc\,\theta$	Find $sec\,\theta$	Find $cot\,\theta$
$A)\ \frac{17}{15}$ $B)\ \frac{17}{8}$ $C)\ \frac{8}{17}$ $D)\ \frac{8}{15}$	$A)\ \frac{17}{15}$ $B)\ \frac{17}{8}$ $C)\ \frac{8}{17}$ $D)\ \frac{8}{15}$	$A)\ \frac{17}{15}$ $B)\ \frac{17}{8}$ $C)\ \frac{8}{17}$ $D)\ \frac{8}{15}$

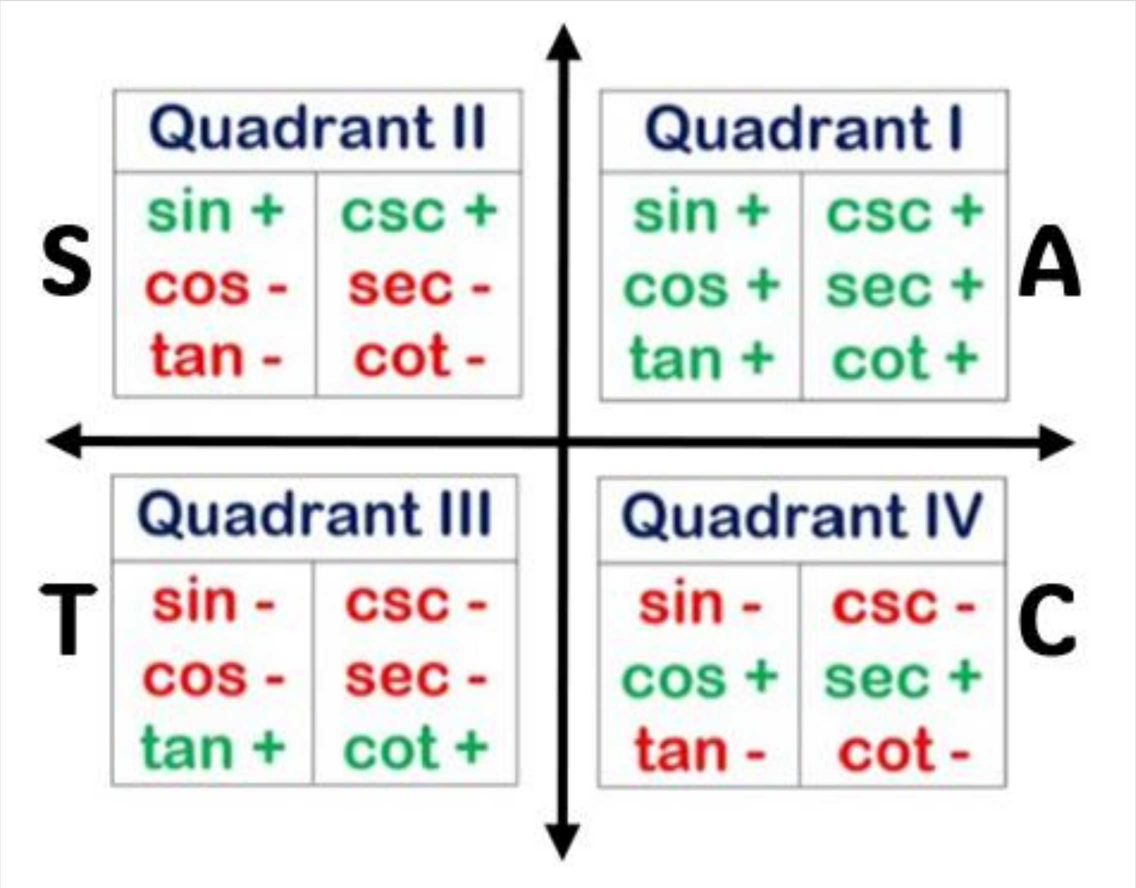
If $\sin\theta = \frac{3}{5}$, then $\csc\theta$=	If $\cos\theta = \frac{8}{17}$, then $\sec\theta$=	If $\tan\theta = \frac{5}{12}$, then $\cot\theta$=	If $\cos A = \frac{9}{13}$, then $\sin A$=
$A)\ \frac{17}{8}$ $B)\ \frac{2\sqrt{22}}{13}$ $C)\ \frac{5}{3}$ $D)\ \frac{12}{5}$	$A)\ \frac{17}{8}$ $B)\ \frac{2\sqrt{22}}{13}$ $C)\ \frac{5}{3}$ $D)\ \frac{12}{5}$	$A)\ \frac{17}{8}$ $B)\ \frac{2\sqrt{22}}{13}$ $C)\ \frac{5}{3}$ $D)\ \frac{12}{5}$	$A)\ \frac{17}{8}$ $B)\ \frac{2\sqrt{22}}{13}$ $C)\ \frac{5}{3}$ $D)\ \frac{12}{5}$
If $\cos A = \frac{9}{13}$, then $\tan A$=	If $\cos A = \frac{9}{13}$, then $\cot A$=	If $\cos A = \frac{9}{13}$, then $\csc A$=	If $\sec B = \frac{11}{3}$, then $\sin B$=
$A)\ \frac{2\sqrt{22}}{9}$ $B)\ \frac{9\sqrt{22}}{44}$ $C)\ \frac{13}{2\sqrt{22}}$ $D)\ \frac{13}{9}$	$A)\ \frac{2\sqrt{22}}{9}$ $B)\ \frac{9\sqrt{22}}{44}$ $C)\ \frac{13\sqrt{22}}{44}$ $D)\ \frac{13}{9}$	$A)\ \frac{2\sqrt{22}}{9}$ $B)\ \frac{9\sqrt{22}}{44}$ $C)\ \frac{13}{2\sqrt{22}}$ $D)\ \frac{13}{9}$	$A)\ \frac{4\sqrt{7}}{3}$ $B)\ \frac{11\sqrt{7}}{28}$ $C)\ \frac{4\sqrt{7}}{11}$ $D)\ \frac{3\sqrt{7}}{28}$

If $sec\,B = \frac{11}{3}$, then $tan\,B$=	If $sec\,B = \frac{11}{3}$, then $csc\,B$=	If $sec\,B = \frac{11}{3}$, then $cot\,B$=	If $tan\,C = 3$, then $\sin C$=
$A)\ \frac{4\sqrt{7}}{3}$ $B)\ \frac{11}{4\sqrt{7}}$ $C)\ \frac{4\sqrt{7}}{11}$ $D)\ \frac{3\sqrt{7}}{28}$	$A)\ \frac{4\sqrt{7}}{3}$ $B)\ \frac{11}{4\sqrt{7}}$ $C)\ \frac{4\sqrt{7}}{11}$ $D)\ \frac{3\sqrt{7}}{28}$	$A)\ \frac{4\sqrt{7}}{3}$ $B)\ \frac{11}{4\sqrt{7}}$ $C)\ \frac{4\sqrt{7}}{11}$ $D)\ \frac{3\sqrt{7}}{28}$	$A)\ \frac{3}{\sqrt{10}}$ $B)\ \sqrt{10}$ $C)\ \frac{\sqrt{10}}{10}$ $B)\ \frac{\sqrt{10}}{3}$

If $tan\,C = 3$, then $\cos C$=	If $tan\,C = 3$, then $\sec C$=	If $tan\,C = 3$, then $\csc C$=
$A)\ \frac{3}{\sqrt{10}}$ $B)\ \sqrt{10}$ $C)\ \frac{\sqrt{10}}{10}$ $B)\ \frac{\sqrt{10}}{3}$	$A)\ \frac{3}{\sqrt{10}}$ $B)\ \sqrt{10}$ $C)\ \frac{\sqrt{10}}{10}$ $B)\ \frac{\sqrt{10}}{3}$	$A)\ \frac{3}{\sqrt{10}}$ $B)\ \sqrt{10}$ $C)\ \frac{\sqrt{10}}{10}$ $B)\ \frac{\sqrt{10}}{3}$



Quadrant II
Quadrant I
Quadrant III
Quadrant IV
y
x
$\theta' = 180° - \theta$
$\theta' = \pi - \theta$
$\theta' = \theta$
$\theta' = \theta - 180°$
$\theta' = \theta - \pi$
$\theta' = 360° - \theta$
$\theta' = 2\pi - \theta$



S
Quadrant II
sin + csc +
cos - sec -
tan - cot -
Quadrant I
sin + csc +
cos + sec +
tan + cot +
A
T
Quadrant III
sin - csc -
cos - sec -
tan + cot +
Quadrant IV
sin - csc -
cos + sec +
tan - cot -
C

Sketch each angle. Then find the measure of its reference angle.

$155°$	$45°$	$-150°$	$-60°$
$A)\ 45°$ $B)\ 30°$ $C)\ 25°$ $D)\ 60°$	$A)\ 45°$ $B)\ 30°$ $C)\ 25°$ $D)\ 60°$	$A)\ 45°$ $B)\ 30°$ $C)\ 25°$ $D)\ 60°$	$A)\ 45°$ $B)\ 30°$ $C)\ 25°$ $D)\ 60°$

$\frac{11\pi}{6}$	$\frac{4\pi}{9}$	$-\frac{8\pi}{3}$	$-\frac{11\pi}{9}$	$\frac{23\pi}{6}$
$A)\ \frac{2\pi}{9}$ $B)\ \frac{\pi}{6}$ $C)\ \frac{4\pi}{9}$ $D)\ \frac{\pi}{3}$	$A)\ \frac{2\pi}{9}$ $B)\ \frac{\pi}{6}$ $C)\ \frac{4\pi}{9}$ $D)\ \frac{\pi}{3}$	$A)\ \frac{2\pi}{9}$ $B)\ \frac{\pi}{6}$ $C)\ \frac{4\pi}{9}$ $D)\ \frac{\pi}{3}$	$A)\ \frac{2\pi}{9}$ $B)\ \frac{\pi}{6}$ $C)\ \frac{4\pi}{9}$ $D)\ \frac{\pi}{3}$	$A)\ \frac{2\pi}{9}$ $B)\ \frac{\pi}{6}$ $C)\ \frac{4\pi}{9}$ $D)\ \frac{\pi}{3}$

Find the exact value of each trigonometric function.

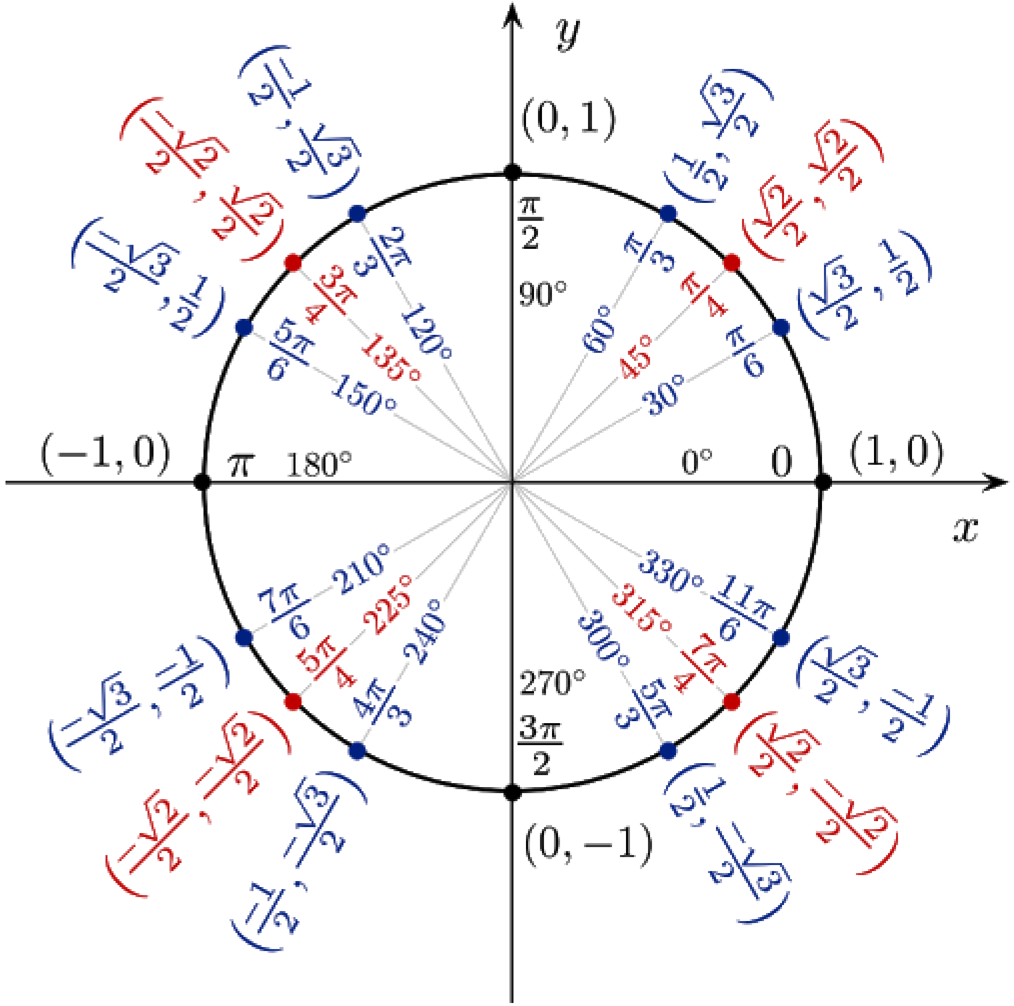
$\tan \frac{7\pi}{4}$	$\cos\left(-\frac{11\pi}{4}\right)$	$\sin(-150°)$
$A)\ -1$ $B)\ \sqrt{2}$ $C)\ -\frac{\sqrt{2}}{2}$ $D)\ \frac{12}{5}$	$A)\ -1$ $B)\ \sqrt{2}$ $C)\ -\frac{\sqrt{2}}{2}$ $D)\ \frac{12}{5}$	$A)\ -\frac{1}{2}$ $B)\ \sqrt{3}$ $C)\ -\sqrt{2}$ $D)\ \frac{1}{2}$
$\csc \frac{\pi}{4}$	$\sec 225°$	$\cot 30°$
$A)\ -1$ $B)\ \sqrt{2}$ $C)\ -\frac{\sqrt{2}}{2}$ $D)\ \frac{12}{5}$	$A)\ -\frac{1}{2}$ $B)\ \sqrt{3}$ $C)\ -\sqrt{2}$ $D)\ \frac{1}{2}$	$A)\ -\frac{1}{2}$ $B)\ \sqrt{3}$ $C)\ -\sqrt{2}$ $D)\ \frac{1}{2}$

The terminal side of angle θ in standard position intersects the unit circle at each point *P*. Find cos θ and sin θ.

$P(\cos\theta, \sin\theta)$

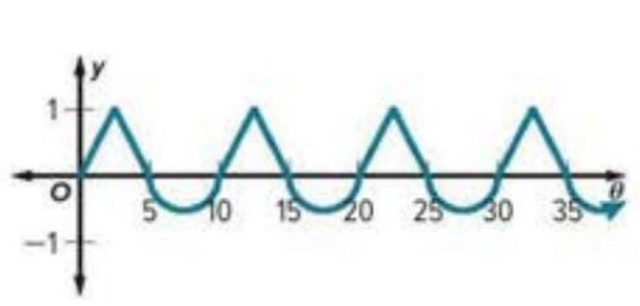
$P\left(-\frac{12}{13}, \frac{5}{13}\right)$	$P\left(-\frac{4}{5}, -\frac{3}{5}\right)$	$P(0, -1)$
A) $\cos\theta = \frac{5}{13}$, $\sin\theta = \frac{12}{13}$	A) $\cos\theta = -\frac{3}{5}$, $\sin\theta = -\frac{4}{5}$	A) $\cos\theta = 0$, $\sin\theta = 1$
B) $\cos\theta = \frac{5}{13}$, $\sin\theta = -\frac{12}{13}$	B) $\cos\theta = -\frac{4}{5}$, $\sin\theta = -\frac{3}{5}$	B) $\cos\theta = -1$, $\sin\theta = 0$
C) $\cos\theta = -\frac{12}{13}$, $\sin\theta = \frac{5}{13}$	C) $\cos\theta = -\frac{5}{4}$, $\sin\theta = -\frac{3}{5}$	C) $\cos\theta = 1$, $\sin\theta = 0$
D) $\cos\theta = -\frac{12}{13}$, $\sin\theta = -\frac{5}{13}$	D) $\cos\theta = \frac{3}{5}$, $\sin\theta = \frac{4}{5}$	D) $\cos\theta = 0$, $\sin\theta = -1$

The point $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ lies in which quadrant?	Which angle has unit−circle point $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$?
$A)$ Quadrant I $B)$ Quadrant II $C)$ Quadrant III $D)$ Quadrant IV	$A)$ $60°$ $B)$ $120°$ $C)$ $240°$ $D)$ $300°$

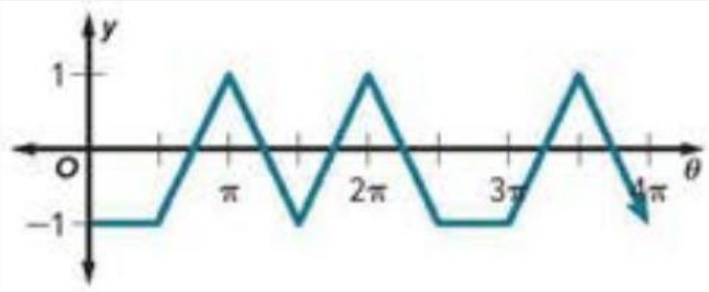


24	استخدام خصائص الدوال الدورية لإيجاد قيمة الدوال المثلثية		
	Use the properties of periodic functions to evaluate trigonometric functions.	(13-18)	441

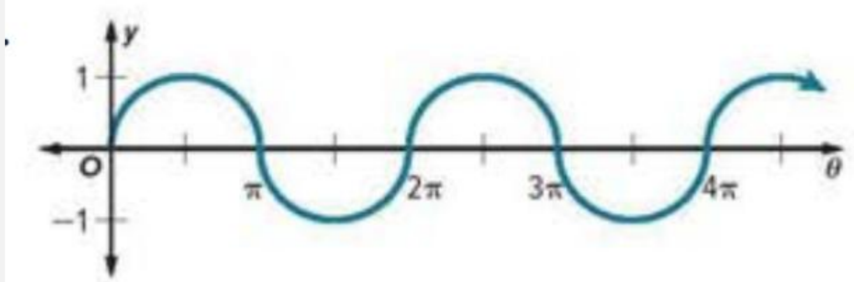
Determine the period of the function.



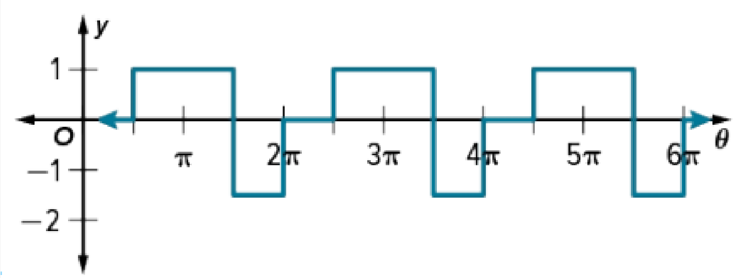
$A)\ 10$ $B)\ 2\pi$ $C)\ \frac{5\pi}{2}$ $D)\ 5$



$A)\ 10$ $B)\ 2\pi$ $C)\ \frac{5\pi}{2}$ $D)\ 5$

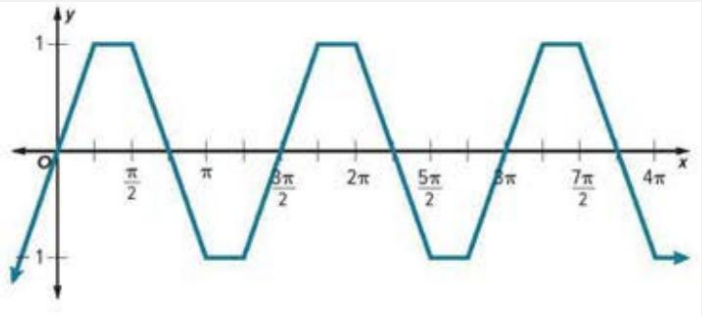


$A)\ 10$ $B)\ 2\pi$ $C)\ \frac{5\pi}{2}$ $D)\ 5$

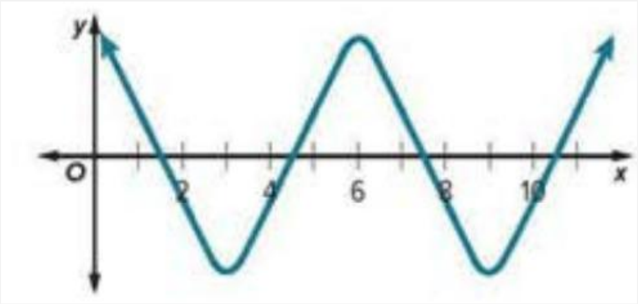


$A)\ 10$ $B)\ 2\pi$ $C)\ \frac{5\pi}{2}$ $D)\ 5$

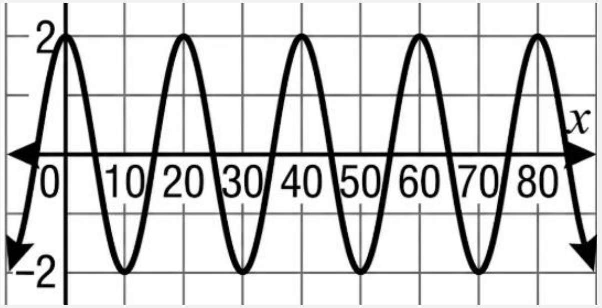
Determine the period of the function.



$A)\ 6 \qquad B)\ 4 \qquad C)\ \frac{3\pi}{2} \qquad D)\ 20$



$A)\ 6 \qquad B)\ 4 \qquad C)\ \frac{3\pi}{2} \qquad D)\ 20$



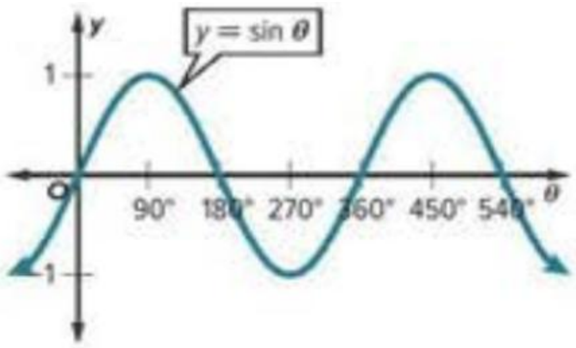
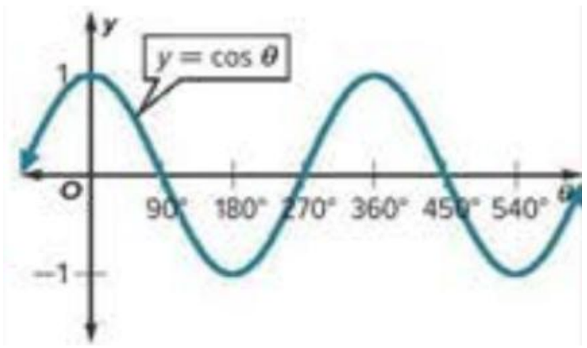
$A)\ 6 \qquad B)\ 4 \qquad C)\ \frac{3\pi}{2} \qquad D)\ 20$

$A)\ 6 \qquad B)\ 4 \qquad C)\ \frac{3\pi}{2} \qquad D)\ 20$

Find the exact value of each expression.

$\cos \frac{10\pi}{3}$	$\sin \frac{21\pi}{4}$	$\cos \frac{11\pi}{3}$
$A)\ -\frac{1}{2}$ $B)\ \frac{\sqrt{3}}{2}$ $C)\ -\frac{\sqrt{2}}{2}$ $D)\ \frac{1}{2}$	$A)\ -\frac{1}{2}$ $B)\ \frac{\sqrt{3}}{2}$ $C)\ -\frac{\sqrt{2}}{2}$ $D)\ \frac{1}{2}$	$A)\ -\frac{1}{2}$ $B)\ \frac{\sqrt{3}}{2}$ $C)\ -\frac{\sqrt{2}}{2}$ $D)\ \frac{1}{2}$
$\cos 60°$	$\sin 600°$	$\sin \frac{8\pi}{3}$
$A)\ \frac{4}{5}$ $B)\ -\frac{\sqrt{3}}{2}$ $C)\ \frac{1}{2}$ $D)\ \frac{1}{5}$	$A)\ \frac{4}{5}$ $B)\ -\frac{\sqrt{3}}{2}$ $C)\ \frac{1}{2}$ $D)\ \frac{1}{5}$	$A)\ -\frac{1}{2}$ $B)\ \frac{\sqrt{3}}{2}$ $C)\ -\frac{\sqrt{2}}{2}$ $D)\ \frac{1}{2}$

Sine and Cosine Functions

Function	$y = a \sin bx$	$y = a \cos bx$
Parent graph		
Domain	All real numbers	All real numbers
Range	$\{y \mid yMin \le y \le yMax\}$	$\{y \mid yMin \le y \le yMax\}$
Amplitude	$\lvert a\rvert$ OR $\frac{yMax - yMin}{2}$	$\lvert a\rvert$ OR $\frac{yMax - yMin}{2}$
Midline	$y = 0$	$y = 0$
Period	$\frac{360°}{b}$	$\frac{360°}{b}$
Oscillation	Between Minimum point and Maximum point	Between Minimum point and Maximum point

What is the amplitude of the parent function $y = \sin x$?	What is the period of $y = \cos x$?	What is the domain of $y = \sin x$?	What is the range of $y = \cos x$?
$A)$ 0 $B)$ 1 $C)$ 360 $D)$ -1	$A)$ 90° $B)$ 180° $C)$ 360° $D)$ 720°	$A)$ $-1 \leq y \leq 1$ $B)$ All real numbers $C)$ $0 \leq x \leq 360$ $D)$ Positive numbers only	$A)$ $0 \leq y \leq 1$ $B)$ All real numbers $C)$ $-1 \leq y \leq 1$ $D)$ $-360 \leq y \leq 360$
What is the midline of the parent sine function?	**Between which values do the sine and cosine graphs oscillate?**	**Which function starts at $(0,1)$?**	**What is the maximum value of the parent sine function?**
$A)$ $y = 0$ $B)$ $x = 0$ $C)$ $y = 1$ $D)$ $x = 1$	$A)$ 0 and 1 $B)$ -360 and 360 $C)$ -2 and 2 $D)$ -1 and 1	$A)$ $y = cos\,x$ $B)$ $y = sin\,x$ $C)$ $y = tan\,x$ $D)$ $y = x^2$	$A)$ -1 $B)$ 0 $C)$ 1 $D)$ 2

Find the amplitude of each function.

Amplitude	$\|a\|$

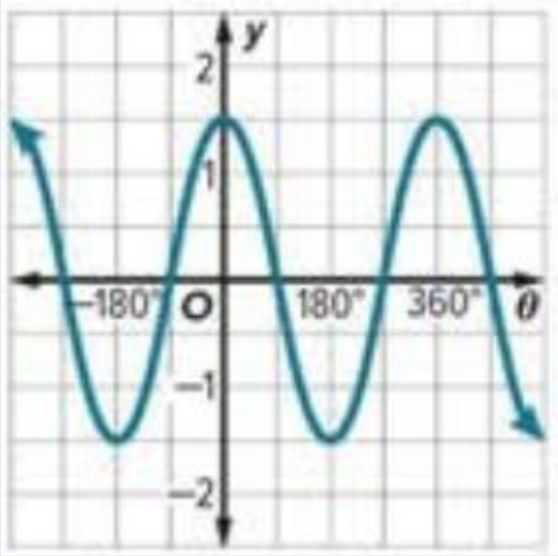
$y = 2\cos\theta$	$y = 2\sin\theta$	$y = \cos\frac{1}{2}\theta$
$A)\ \frac{3}{4}$ $B)\ 2$ $C)\ 1$ $D)\ \frac{1}{2}$ $E)\ 3$	$A)\ \frac{3}{4}$ $B)\ 2$ $C)\ 1$ $D)\ \frac{1}{2}$ $E)\ 3$	$A)\ \frac{3}{4}$ $B)\ 2$ $C)\ 1$ $D)\ \frac{1}{2}$ $E)\ 3$
$y = \frac{3}{4}\cos\theta$	$y = \frac{1}{2}\sin 2\theta$	$y = 3\cos 2\theta$
$A)\ \frac{3}{4}$ $B)\ 2$ $C)\ 1$ $D)\ \frac{1}{2}$ $E)\ 3$	$A)\ \frac{3}{4}$ $B)\ 2$ $C)\ 1$ $D)\ \frac{1}{2}$ $E)\ 3$	$A)\ \frac{3}{4}$ $B)\ 2$ $C)\ 1$ $D)\ \frac{1}{2}$ $E)\ 3$

Find the period of each function.

Period	$\frac{360°}{b}$

$y = 2\cos\theta$	$y = 2\sin\theta$	$y = \cos\frac{1}{2}\theta$
$A)\ 90°$ $B)\ 720°$ $C)\ 180°$ $D)\ 360°$	$A)\ 90°$ $B)\ 720°$ $C)\ 180°$ $D)\ 360°$	$A)\ 90°$ $B)\ 720°$ $C)\ 180°$ $D)\ 360°$
$y = \frac{3}{4}\cos\theta$	$y = \frac{1}{2}\sin 2\theta$	$y = 3\cos 2\theta$
$A)\ \frac{\pi}{2}$ $B)\ 4\pi$ $C)\ \pi$ $D)\ 2\pi$	$A)\ \frac{\pi}{2}$ $B)\ 4\pi$ $C)\ \pi$ $D)\ 2\pi$	$A)\ \frac{\pi}{2}$ $B)\ 4\pi$ $C)\ \pi$ $D)\ 2\pi$

For each graph, identify the period

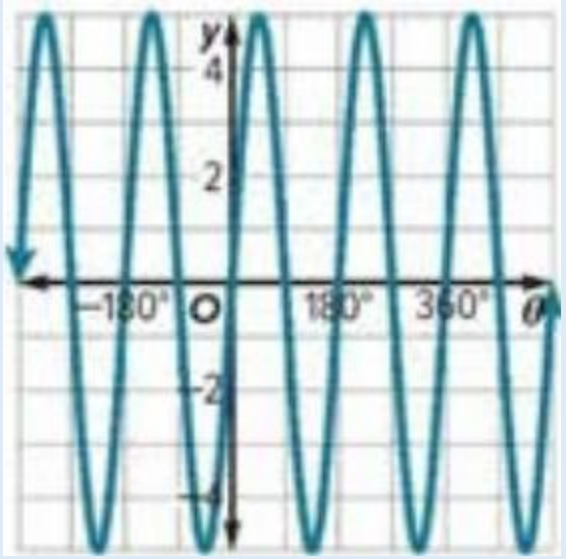


$A)\ 90°$

$B)\ 360°$

$C)\ 180°$

$D)\ 270°$

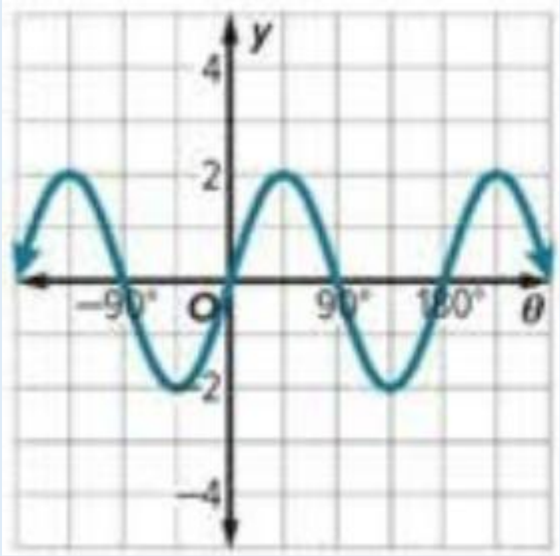


$A)\ 90°$

$B)\ 360°$

$C)\ 180°$

$D)\ 270°$



$A)\ 90°$

$B)\ 360°$

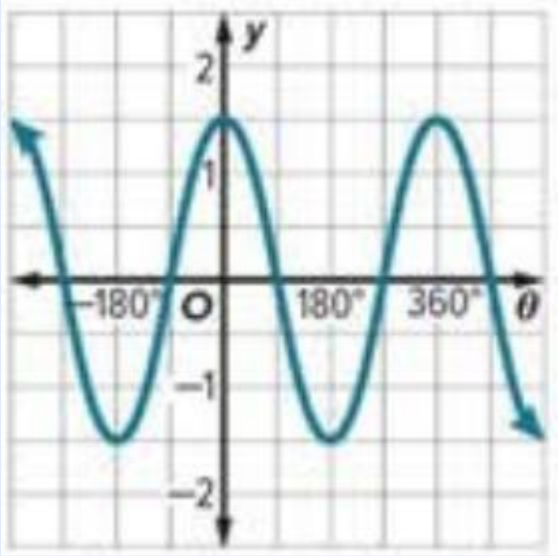
$C)\ 180°$

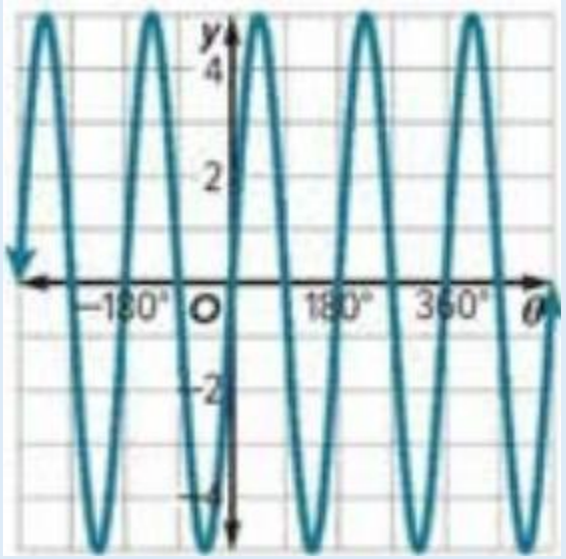
$D)\ 270°$

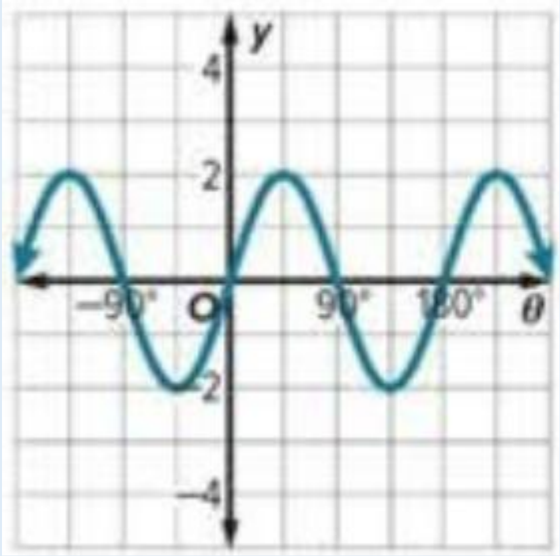
28	وصف دوال الجيب (sin) وجيب التمام (cos) والظل (tan) وتمثيلها بيانيا		
	Describe and graph the sine, cosine, and tangent functions.	(24-26)	452

For each graph, write an equation.

Function	$y = a \sin bx$	$y = a \cos bx$





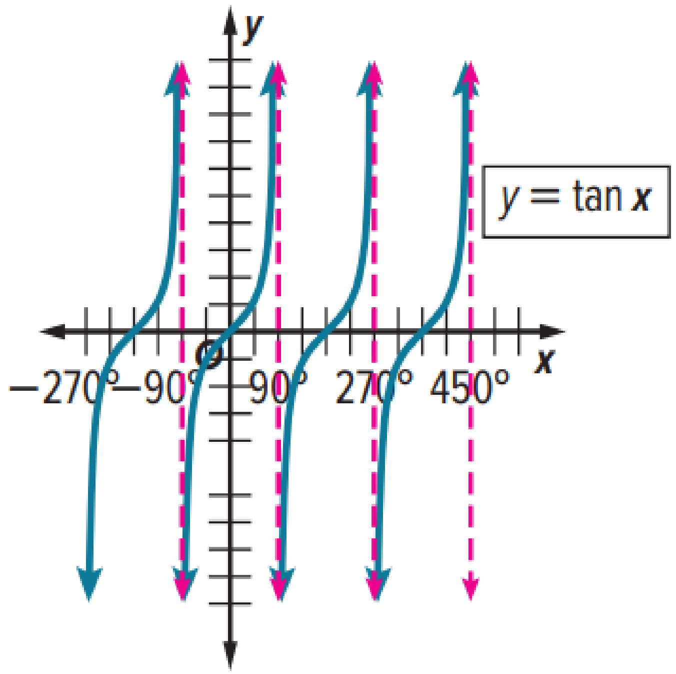


$A)\ y = 2sin\ 2x$	$A)\ y = 2sin\ 2x$	$A)\ y = 2sin\ 2x$
$B)\ y = \frac{3}{2} cos\ x$	$B)\ y = \frac{3}{2} cos\ x$	$B)\ y = \frac{3}{2} cos\ x$
$C)\ y = 5sin\ 2x$	$C)\ y = 5sin\ 2x$	$C)\ y = 5sin\ 2x$
$D)\ y = 2\cos 2x$	$D)\ y = 2\cos 2x$	$D)\ y = 2\cos 2x$

Graphs of Tangent Functions

Function	$y = a\tan bx$
Domain	$\{x \mid x \neq \frac{(90+180n)°}{\lvert b \rvert}$, n is an integer$\}$
Range	All real numbers
Amplitude	undefined
Period	$\frac{180°}{\lvert b \rvert}$ *OR* $\frac{\pi}{\lvert b \rvert}$
x-intercepts	$\frac{180n}{\lvert b \rvert}$ or $\frac{\pi n}{\lvert b \rvert}$, where n is an integer.
Midline	$y = 0$
Asymptotes	$x = \frac{(90+180n)°}{\lvert b \rvert}$ or $\frac{\left(\frac{\pi}{2}+\pi n\right)°}{\lvert b \rvert}$, where n is an integer.

Graph



Find the period, asymptotes, *x*-intercepts, midline, and transformations of each tangent function. Then graph the function.

$y = \tan 3x$

$\frac{180°}{|b|}$ *OR* $\frac{\pi}{|b|}$ $\quad x = \frac{(90+180n)°}{|b|}$ *or* $\frac{\left(\frac{\pi}{2}+\pi n\right)°}{|b|}$ $\quad \frac{180n}{|b|}$ or $\frac{\pi n}{|b|}$

Find the period	Find the asymptotes	Find the x-intercepts	Find the midline
$A)\ 360°$	$A)\ x = -30, 0, 60$	$A)\ x = 0, 30, 60$	$A)\ y = 1$
$B)\ 45°$	$B)\ x = -30, 0, 30, 60$	$B)\ x = 0, 60, 120$	$B)\ y = 0$
$C)\ 720°$	$C)\ x = -30, 0, 30$	$C)\ x = -60, 0, 30$	$C)\ y = 2$
$D)\ 60°$	$D)\ x = 0, 60, 120$	$D)\ x = -60, 60, -120$	$D)\ y = -1$

Find the period, asymptotes, *x*-intercepts, midline, and transformations of each tangent function. Then graph the function.

$$y = \tan 3x$$

Transformations

$A)\ a = 3,$ stretched vertically.

$B)\ a = 3,$ compressed horizontally.

$C)\ b = 3,$ compressed horizontally.

$D)\ b = 3,$ stretched vertically.

$$y = a\tan bx$$

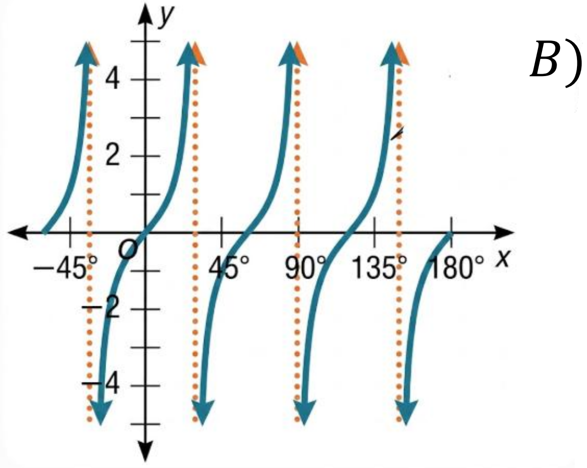
Reflected about the x-axis $-f(x)$

Vertical Dilation
Stretch: $|a| > 1$
Compress: $0 < |a| < 1$

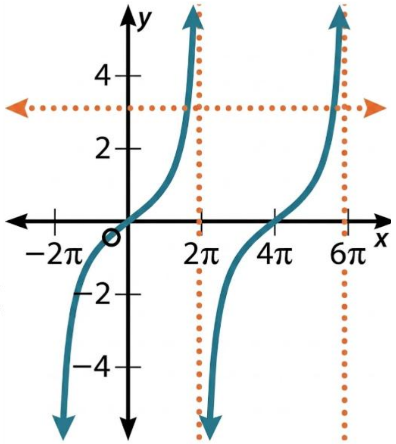
Horizontal Dilation
Stretch: $0 < |b| < 1$
Compress: $|b| > 1$

Graph

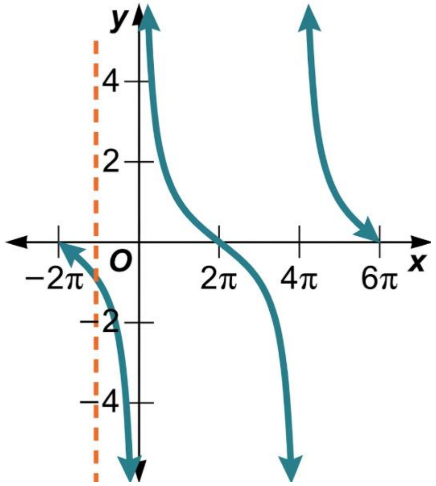
$A)$



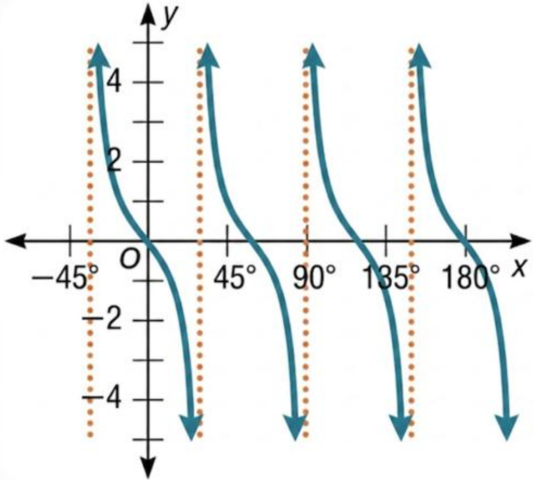
$B)$



$C)$



$D)$



Find the period, asymptotes, x-intercepts, midline, and transformations of each tangent function. Then graph the function.

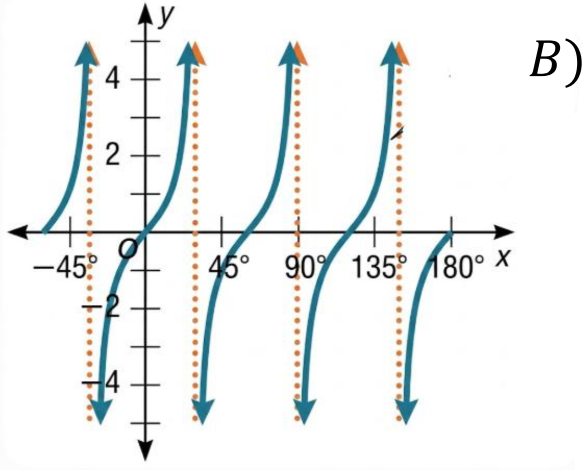
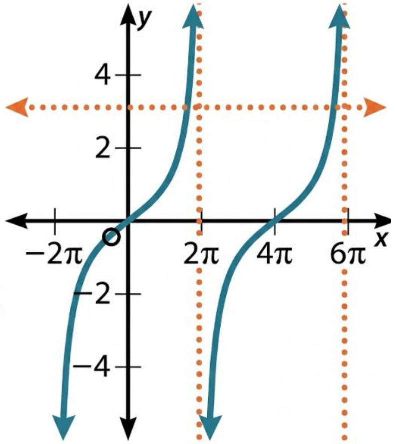
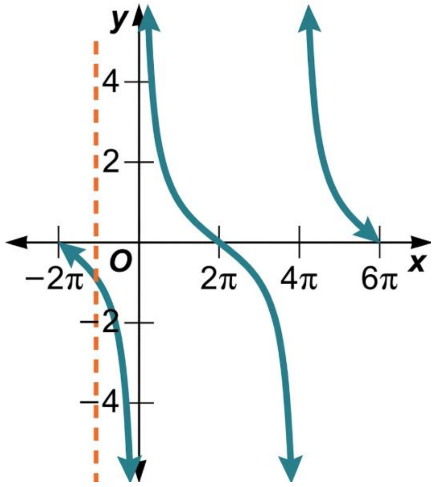
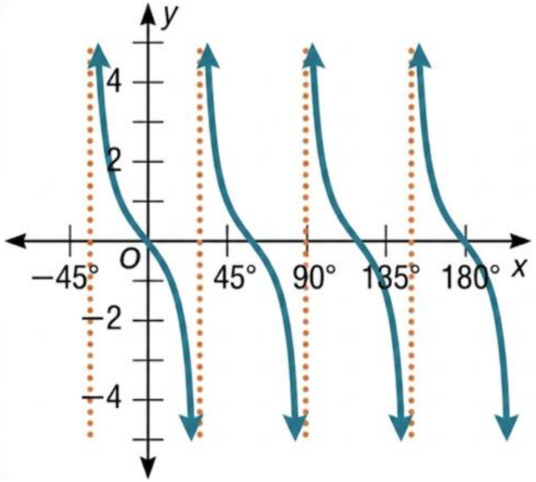
$y = \tan 0.25x$

$\frac{180°}{|b|}$ OR $\frac{\pi}{|b|}$ $\quad x = \frac{(90+180n)°}{|b|}$ or $\frac{\left(\frac{\pi}{2}+\pi n\right)°}{|b|}$ $\quad \frac{180n}{|b|}$ or $\frac{\pi n}{|b|}$

Find the period	Find the asymptotes	Find the x-intercepts	Find the midline
A) π B) $\frac{\pi}{4}$ C) 4π D) $\frac{\pi}{3}$	A) $x = -2\pi, 2\pi$ B) $x = -4\pi, 0, 4\pi$ C) $x = -2\pi, 0, 2\pi$ D) $x = -4\pi, 0, 2\pi$	A) $x = -2\pi, 2\pi$ B) $x = -4\pi, 0, 4\pi$ C) $x = -2\pi, 0, 2\pi$ D) $x = -4\pi, 0, 2\pi$	A) $y = 1$ B) $y = 0$ C) $y = 2$ D) $y = -1$

Find the period, asymptotes, *x*-intercepts, midline, and transformations of each tangent function. Then graph the function.

$y = \tan 0.25x$

Transformations	Graph
$A)\ a = 0.25$, stretched vertically. $B)\ a = 0.25$, compressed vertically. $C)\ b = 0.25$, compressed horizontally. $D)\ b = 0.25$, stretched horizontally.	$A)$  $B)$  $C)$  $D)$ 

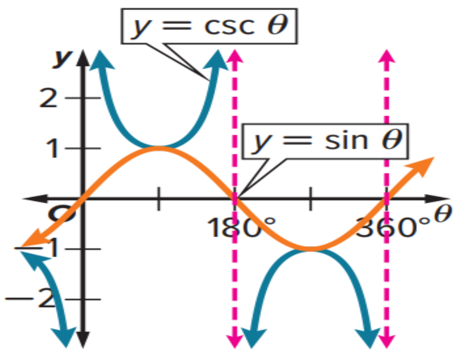
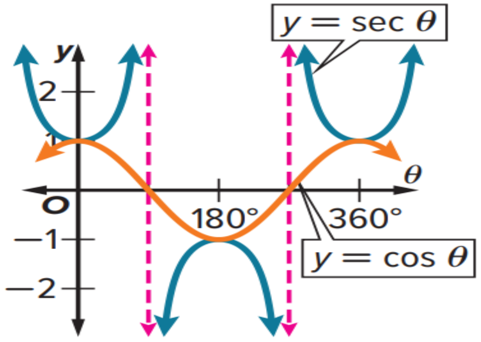
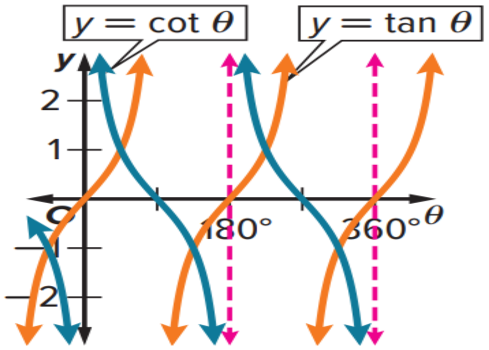
$y = a\tan bx$

Reflected about the x-axis $-f(x)$

Vertical Dilation
Stretch: $|a| > 1$
Compress: $0 < |a| < 1$

Horizontal Dilation
Stretch: $0 < |b| < 1$
Compress: $|b| > 1$

Graphs of Reciprocal Functions

Function	$y = acsc\ bx$	$y = asec\ bx$	$y = acot\ bx$
Graph			
Domain	$\{x \mid x \neq 180n°,\ n$ is an integer$\}$	$\{x \mid x \neq (90 + 180n)°,\ n$ is an integer$\}$	$\{x \mid x \neq 180n°,\ n$ is an integer$\}$
Range	$\{y \mid y \leq -1$ or $y \geq 1\}$	$\{y \mid y \leq -1$ or $y \geq 1\}$	all real numbers
Amplitude	undefined	undefined	undefined
Period	$\frac{360°}{\lvert b \rvert}$ *or* $\frac{2\pi}{\lvert b \rvert}$	$\frac{360°}{\lvert b \rvert}$ *or* $\frac{2\pi}{\lvert b \rvert}$	$\frac{180°}{\lvert b \rvert}$ *or* $\frac{\pi}{\lvert b \rvert}$
Asymptotes	$\frac{180n}{\lvert b \rvert}$ or $\frac{\pi n}{\lvert b \rvert}$	$\frac{90+180n}{\lvert b \rvert}$ or $\frac{\frac{\pi}{2}+\pi n}{\lvert b \rvert}$	$\frac{180n}{\lvert b \rvert}$ or $\frac{\pi n}{\lvert b \rvert}$
Midline	$y = 0$	$y = 0$	$y = 0$

What is the period of the parent function $y = \cot x$?	Which reciprocal function has the domain $\{x \mid x \neq (90 + 180n)°, n$ is an integer$\}$?	What is the range of $y = \csc x$?	What is the amplitude of $y = \sec x$?
$A)\ \frac{\pi}{2}$ $B)\ \pi$ $C)\ \frac{3\pi}{2}$ $D)\ 2\pi$	$A)\ y = \sec x$ $B)\ y = \csc x$ $C)\ y = \cot x$ $D)\ y = \tan x$	$A)\ y \leq -1\ or\ y \geq 1$ $B) -1 \leq y \leq 1$ $C)\ 360$ $D)$ All real numbers	$A)\ 1$ $B)\ 0$ $C)\ 360$ $D)$ Undefined
Which reciprocal function has all real numbers as its range?	**What is the midline of the reciprocal parent functions shown?**	**For $y = \csc 3x$, what is the maximum value?**	**For $y = 3\sec x$, what is the minimum value?**
$A)\ y = \sec x$ $B)\ y = \csc x$ $C)\ y = \cot x$ $D)\ y = \tan x$	$A)\ x = 0$ $B)\ y = 1$ $C)\ y = 0$ $D)$ Undefined	$A)\ (-60, 1)$ $B)\ (-30, -1)$ $C)\ (30, -1)$ $D)(60, -1)$	$A)\ (3, 0)$ $B)\ (180, -3)$ $C)\ (-90, 3)$ $D)\ (0, 3)$

Done

اللهُم وفقني وافتح على قلبي ونور بصيرتي ولا تضيع
لي يا الله تعباً وسخر لي من حيث لا أحتسب عوناً

♡ بالتوفيق والنجاح إن شاء الله ♡