

Name: Solutions

Course End Review: ANSWER KEY

Functions and Relations

Introduction to Functions:

1. (a) -2 (b) $12x^2 + 176x + 646$
2. (a) D: $x \in \mathbb{R}$ R: $y \geq -3, y \in \mathbb{R}$
 (b) D: $x \geq 0, x \in \mathbb{R}$ R: $y \in \mathbb{R}$
 (c) D: $x \geq 0, x \in \mathbb{R}$ R: $y \leq 0, y \in \mathbb{R}$
3. 20
4. $f^{-1}(x) = \frac{x+2}{4}$
5. (a) $f^{-1}(x) = 2x - 3$ (b) $y^{-1} = 3 \pm \sqrt{\frac{x-1}{4}}$
6. -6 and -4
7. (a) reflection in x-axis
vertical stretch of a factor of 5
horizontal compression of a factor of $\frac{1}{4}$
horizontal shift of 2 units right
vertical shift of 7 units up
 (b) vertical compression of a factor of $\frac{1}{3}$
reflection in the y-axis
horizontal stretch of a factor of $\frac{5}{2}$
horizontal shift of 4 units left
vertical shift of 6 units down
8. (a) $-5 \leq x \leq 4, x \in \mathbb{R}$ (b) $-3 \leq y \leq 6, y \in \mathbb{R}$
 (c) 1 (d) -1 and 3
9. $y = \frac{15}{49}(x-3)^2 - 5$

Quadratic and Rational Expressions:

10. (a) 45 m

(b) 6 sec

11. 5/2

12. -4.32 or -1.68

13. (a)
$$\frac{4x^2 + 13x - 3}{(x+1)(x+2)(x+3)}$$

(b)
$$\frac{x^2 + x - 6}{x(x-3)}$$

14.
$$\frac{3m(m+4)}{(m+2)(m-4)}$$

restrictions: -4, -2, -1

15.
$$\frac{3\sqrt{6} - 12}{2}$$

0, 4, 5

16. 6³⁰

17.
$$\frac{x}{2(3x+2)(2x-1)}$$

18. f(x) = (x-3)² - 2

Exponential Functions:

19. (a) -7

(b) 1

20. -29/3

21. (a) 2√3

(b) -20√3

22. 1/9

23. 4m²

Trigonometric Functions:

24. (a) 60° and 300°

(b) 30°, 150°

199° and 341°

25. (a)

$$\frac{\sin x}{\cos x} + \frac{1}{\left(\frac{\sin x}{\cos x}\right)} = \frac{1}{\sin x \cos x}$$

$$\frac{\sin x}{\cos x} + \frac{\cos x}{\sin x} = \frac{1}{\sin x \cos x}$$

$$\frac{\sin^2 x}{\sin x \cos x} + \frac{\cos^2 x}{\sin x \cos x} = \frac{1}{\sin x \cos x}$$

$$\frac{\sin^2 x + \cos^2 x}{\sin x \cos x} = \frac{1}{\sin x \cos x}$$

$\frac{1}{\sin x \cos x}$

=

$\frac{1}{\sin x \cos x}$

=

RS

$\frac{1}{\sin x \cos x}$

=

LS

=

RS

(b)

$$\frac{1 - \cos^2 x}{1 - \cos x} = 1 + \cos x$$

$$\frac{(1 + \cos x)(1 - \cos x)}{(1 - \cos x)} = 1 + \cos x$$

$$1 + \cos x = 1 + \cos x \quad \therefore \text{LS} = \text{RS}$$

(c)

$\frac{\cos x \sin x}{\sin^2 x} = \frac{1}{\tan x}$	$\frac{\cos x (\cancel{1/\cos x})}{\sin x (\cancel{1/\cos x})} = \frac{1}{\tan x}$
$\frac{\cos x \sin x}{\sin x \sin x} = \frac{1}{\tan x}$	$\frac{1}{\left(\frac{\sin x}{\cos x}\right)} = \frac{1}{\tan x}$
$\frac{\cos x}{\sin x} = \frac{1}{\tan x}$	$\frac{1}{\tan x} = \frac{1}{\tan x}$
$\therefore \text{LS} = \text{RS}$	$\therefore \text{LS} = \text{RS}$

26. 30° and 150°27. -1/228. √2/2

29. 35° and 145°

30. 48° and 228°

31. (a) 0°, 120°, 180°, 240° and 360°

(b) 62° and 298° (c) 146° and 326°

(d) 60° and 300°

32. 17.6 m

33. (a) 2

(b) 120°

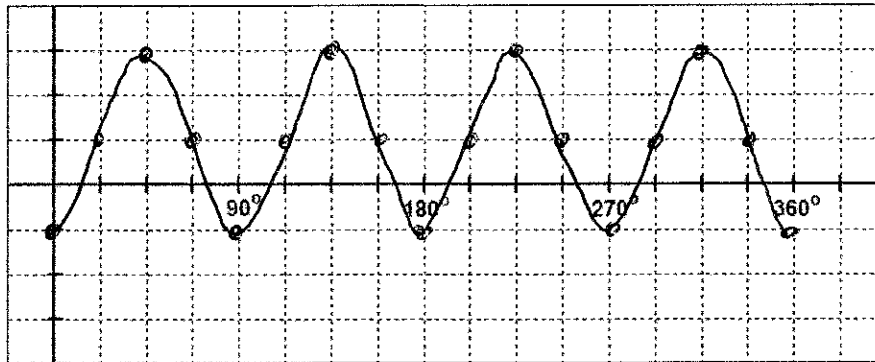
(c) 40° left

(d) 6 up

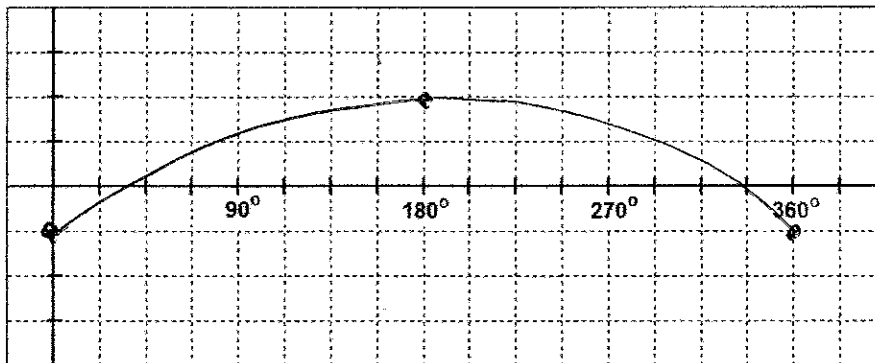
(e) 0° < θ < 270°

(f) -2 ≤ y ≤ 2

34.



35.



Discrete Functions:

36. (a) 40

(b) 40 60

37. (a) 2198

(b) 11, 16 and 21

38. (a) 9

(b) 342