

**Algebra 1B Semester Exam Review ANSWERS**

1. a. A linear function. The  $x$ -values increase by 1, and the  $y$ -values increase by a constant of 3.
- b. A quadratic function. The  $x$ -values increase by 1, and the second differences of  $y$  increase by a constant of 2.
- c. An exponential function. The  $x$ -values increase by 1 and the ratio of the differences in the  $y$ -values is a constant of 2.
2. a. 1, 2, 4, 8, 16
- b. exponential
- c.  $f(x) = 4(2)^x$
- d. increasing
- e. Yes, the function is continuous.
- f. All real numbers
- g. All positive real numbers
- h. The  $x$ -axis ( $y = 0$ )
3. **C**    **II** and **III** are true
4. a. The vertex is at  $(3, -4)$
- b. The axis of symmetry is  $x = 3$ .
- c. The  $y$ -intercept is 5.
- d. The  $x$ -intercepts are 1 and 5.
- e.  $f(x) = (x - 3)^2 - 4$
5. a. The graph has shifted 2 units right and 9 units down.
- b.  $g(x) = (x - 2)^2 - 9$
- c.  $g(x) = x^2 - 4x - 5$
- d. The zeroes of  $g(x)$  are  $-1$  and  $5$ .
- e.  $g(x)$  is increasing on the interval  $x > 2$ .
- f. The axis of symmetry is  $x = 2$ .
6. **A**
7. a. absolute value
- b. quadratic
- c. exponential
- d. linear

8. a.  $f(x), g(x), h(x), j(x)$       b.  $j(x)$   
c.  $f(x), g(x)$       d.  $f(x), g(x), h(x), j(x)$   
e.  $h(x), j(x)$       f.  $f(x), g(x)$   
g.  $g(x)$       h.  $f(x), g(x), h(x), j(x)$   
i.  $f(x), g(x)$

9. **A**

10. a.  $x^3 + 3x^2 - 9x - 4$       b.  $7x^4 + 5x^3 + 3x^2 + 2$

11. a.  $81x^8y^{12}$       b.  $6x^3y^4$       c.  $\frac{5x}{y^5}$

12. a.  $-x^2 - 3x + 1$       b.  $6m^2 - 8m + 23$

13. a.  $8x^2 - 6x - 35$       b.  $4x^2 - 20x + 25$   
c.  $x^2 - 81$       d.  $8x + 2y + 4x^3y^3$

14.  $(x+11)(x+6) - x(x+5)$       or       $12x + 66$

15. **B**  $(x-3)$

16. a.  $5x^2y^2(x+3y)$       b.  $(2x-1)(x+5)$   
c.  $(5x+8)(5x-8)$       d.  $(a-7)^2$

17. a.  $r = -9, -1$       b.  $x = 1, \frac{5}{2}$

- c.  $x = \frac{5 \pm \sqrt{21}}{2} \approx .209$       and       $4.791$

18.

a.

	<i>HAM</i>	<i>HD</i>
<i>A</i>	110	88
<i>B</i>	85	55
<i>C</i>	55	60

b.

	<i>HAM</i>	<i>HD</i>
<i>A</i>	300	200
<i>B</i>	225	150
<i>C</i>	200	200

19.

- $N(d) = 2048\left(\frac{1}{2}\right)^d$
- 32 marbles
- The tenth day.
- As the value of  $x$  increases, the number of marbles decreases and gets closer to 0.

Sample response:

I continued the table by multiplying the number of marbles remaining by one-half to get the next day's number of marbles. After day 10, there were two marbles remaining.

20.

Sample responses:

- The ball does not reach its maximum height at  $t = 2$  seconds. The graph is a parabola that opens downwards since the quadratic coefficient is negative. The first coordinate of the vertex is when the maximum height occurs. The second coordinate of the vertex of the parabola is the maximum height. The vertex has coordinates  $(1.5625, 39.0625)$ .  
Therefore the maximum height occurs at  $t = 1.5625$  seconds.
- The ball hits the ground at  $t = 3.125$  seconds. I solved the equation  $-16t^2 + 50t = 0$ . There are two solutions  $t = 0$  and  $t = 3.125$ . The football is being kicked at  $t = 0$ , which would not be when the football hits the ground after being kicked. The solution  $t = 3.125$  seconds is the solution to the problem.

21.

25 hours

22.

Sample responses.

- Jeff's conclusion is incorrect. From the box-and-whisker plot, one can tell that Suchita worked at most 19 hours less than 25% of the time and that she worked at least 23 hours more than 25% of the time.
- mean = 19, median = 23, mode = 26. The median best represents the data. Half of the data is above and below this value. Only three of the data points are less than the mean, while nine of the data points are greater than the mean.

23.

- Stephan must bowl 165 in the fourth game.

Sample responses:

In order to have an average of 180, Stephan must total 720 pins. In the first three games, his total is 555. He needs to bowl  $720 - 555 = 165$  pins.

**OR**

Solve the equation  $\frac{160+180+215+x}{4} = 180$ .

24. C 40%

25. a.  $\frac{5}{50}$  or  $\frac{1}{10}$  or 0.1 or 10%      b.  $\frac{41}{50}$  or 0.82 or 82%

26. Sample responses:

- Use a spinner with four equal sectors numbered 1, 2, 3, 4. Assign the number 1 to the event of going to the movies and the numbers 2, 3, and 4 to not going to the movies.
- Roll a die. Assign the number 1 to the event of going to the movies, 2, 3, 4 to not going to the movies, and ignore 5 and 6.

27. Sample responses

- The first method is not a simple random sample. The same 50 people could arrive in the math building each morning so each student does not have an equal chance of being selected.
- The second method is not a simple random sample since the students every possible set of 50 students is not equally likely to be chosen.
- The third method is a simple random sample. Each student has the same probability of being selected and every possible set of 50 students is equally likely to be chosen.

28. Sample response.

- This is not a valid conclusion. Although Maryland's maximum points scored is greater than Duke's maximum points scored, the median of Duke's scores is higher than the 3<sup>rd</sup> quartile of Maryland's. Also, Maryland's median is equal to Duke's first quartile.

29.  $\frac{3}{15}$  or  $\frac{1}{5}$  or 0.2 or 20%

30. Sample response:

- Jack's sample is not likely to be representative. The sample excludes students are not in the orchestra. Jill's sample is more likely to be representative; every student has an equal opportunity to be in the sample.

31. •  $\frac{10}{50}$  or  $\frac{1}{5}$  or 0.2 or 20%
- 160 students
32. a. 12 (2 times 3 times 2)                      b.  $\frac{1}{12}$  or  $0.0\overline{83}$  or  $8.\overline{3}\%$
33. a.  $\frac{12}{20}$  or  $\frac{3}{5}$  or 0.6 or 60%                      b. 108 days
34. C
35. Sample response
- The vertical scale on the first graph starts at 0 and increases by 1. The vertical scale on the second graph starts at 1 and increases by 0.2. The smaller scale on the second graph exaggerates the differences in the scores.
36. The daisy will have 20 petals left on day 8.
37.  $x = -7$
38. The values of the function decrease and the values of the function get closer to zero.