Algebra I Regents Exam 0626
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0626AI

1 What is the 20th term of the arithmetic sequence $4, 7, 10, 13, \ldots$?
1) 61
2) 64
3) 79
4) 83

2 What is the value of x in the equation $0.5x - 4 = 8 - x$?
1) 6
2) 8
3) 18
4) 24

3 The binomial $4x^2 - 25$ is equivalent to
1) $4(x + 5)(x - 5)$
2) $4(x - 5)(x - 5)$
3) $(2x - 5)(2x + 5)$
4) $(2x - 5)(2x - 5)$

4 A function is defined by the following set of points:
$\{(3, -4), (-4, 3), (1, 1), (x, 2)\}$
What is a possible value for x?
1) 1
2) 2
3) 3
4) –4

5 The expression $(4xy^2)^3$ is equivalent to
1) $12x^3y^6$
2) $12x^3y^8$
3) $64x^3y^6$
4) $64x^3y^8$

6 Allison was asked to write a third-degree trinomial with a leading coefficient of 4 and a constant term of 5. Which expression satisfies these conditions?
1) $4x^3 - 5$
2) $3x^4 + 5$
3) $4x^3 + 8x^2 + 5$
4) $3x^4 + 2x^3 - 5$

7 Given the sequence $128, 64, 32, \ldots$, which formula could be used to find the nth term of this sequence?
1) $a_n = 128(-2)^{n-1}$
2) $a_n = 128\left(\frac{1}{2}\right)^{n-1}$
3) $a_n = 128 - 2(n - 1)$
4) $a_n = 128 + \frac{1}{2}(n - 1)$

8 When a bicyclist increases the pressure on the brakes, the speed of the bicycle decreases. This relationship can best be described as a
1) negative correlation and causal relationship
2) negative correlation and non-causal relationship
3) positive correlation and causal relationship
4) positive correlation and non-causal relationship

9 A garden club plans to plant 40 flowering plants this year. They will only purchase daffodils that cost \$4 per plant and tulips that cost \$5 per plant. All prices include tax. The club has \$170 to spend on plants. Which equation could be used to find the number of daffodil plants, d, the club purchases?
1) $4d + 5(170 - d) = 40$
2) $4d + 5(40 - d) = 170$
3) $5d + 4(170 - d) = 40$
4) $5d + 4(40 - d) = 170$

10 A function is defined as $h(x) = x^2 - 3x + 1$. What is the value of $h(-1)$?
1) 1
2) 2
3) 3
4) 5

11 The zeros of $p(x) = x(3x + 2)(x - 5)$ are

1) $-\frac{2}{3}$ and 5, only
2) $\frac{2}{3}$ and -5, only
3) $-\frac{2}{3}, 0, 5$
4) $\frac{2}{3}, 0, -5$

12 If $f(x) = 1.25^x$ and $g(x) = 3x + 10$, what is the *smallest* positive integer of x for which $f(x) > g(x)$?

1) 18
2) 19
3) 67
4) 69

13 What is an equation of the line that passes through the points $(2,5)$ and $(-2,-1)$?

1) $y - 5 = \frac{2}{3}(x - 2)$
2) $y - 5 = \frac{3}{2}(x - 2)$
3) $y - 2 = \frac{2}{3}(x - 5)$
4) $y - 2 = \frac{3}{2}(x - 5)$

14 At a local high school, students were asked to name the sport they like to watch the most. The results are summarized in the table below.

	Football	**Basketball**	**Baseball**
Male	40	35	15
Female	20	40	10

Approximately what percentage of female preferred to watch basketball?

1) 35
2) 40
3) 53
4) 57

15 An equation that yields the same solutions as $x^2 - 10x - 24 = 0$ is

1) $(x + 5)^2 = 1$
2) $(x - 5)^2 = 1$
3) $(x + 5)^2 = 49$
4) $(x - 5)^2 = 49$

16 The function $f(x)$ is shifted three units right and four units up. The result of this transformation is

1) $f(x - 3) + 4$
2) $f(x + 3) + 4$
3) $f(x + 4) - 3$
4) $f(x - 4) - 3$

17 Hana was asked to solve a quadratic equation. Her first step is shown below.

$$x^2 - 8x = 3$$

$$\text{Step 1: } x^2 - 8x + 16 = 3 + 16$$

The property that Hana used is the

1) distributive property
2) commutative property
3) additive inverse property
4) addition property of equality

18 A data set is given below:

28 28 28 28 32 32 34 34 40 42

What is the value of the upper quartile of this data set?

1) 28
2) 32
3) 34
4) 42

19 When $-3x^2 + 7x - 1$ is subtracted from $2x^2 - 3x + 10$, the result is

1) $5x^2 + 4x + 9$
2) $5x^2 - 10x + 11$
3) $-5x^2 + 4x + 9$
4) $-5x^2 + 10x - 11$

20 The value of a home in Buffalo can be modeled by the function $V(t) = 96,949(1.0448)^t$, where $V(t)$ is the value of the house after t years. What is the percent of increase in the value of the home each year?

1) 1.0448%
2) 0.0448%
3) 0.448%
4) 4.48%

21 A rod is an old English measure of distance that is equivalent to 5.5 yards. How many inches are 2.5 rods? [1 yard = 3 feet]

1) 66
2) 165
3) 198
4) 495

22 When solving the equation $2x^2 - 3x - 6 = 0$ using the quadratic formula, the solutions are

1) $\frac{3 \pm \sqrt{57}}{4}$
2) $\frac{3 \pm \sqrt{39}}{4}$
3) $\frac{-3 \pm \sqrt{57}}{4}$
4) $\frac{-3 \pm \sqrt{39}}{4}$

23 For which function is the axis of symmetry $x = -4$?

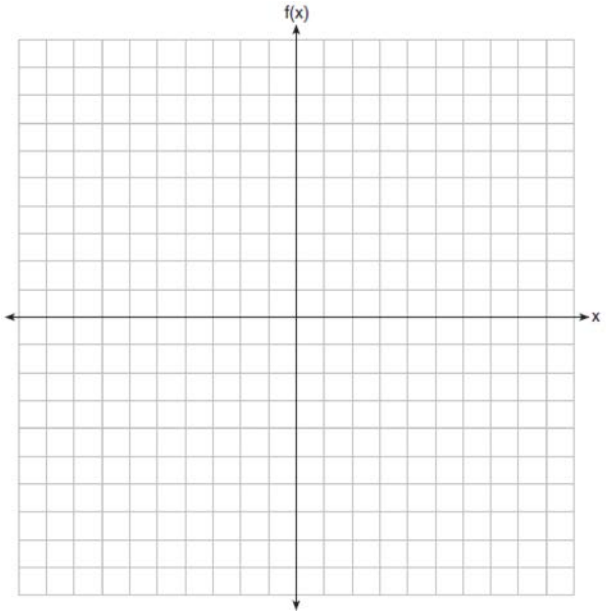
1) $f(x) = -x^2 - 4x - 1$
2) $g(x) = -x^2 + 8x + 5$
3) $h(x) = x^2 + 8x + 3$
4) $k(x) = x^2 + x - 4$

24 In simplest radical form, the product of $2\sqrt{6}$ and $5\sqrt{3}$ is

1) 10
2) 21
3) $30\sqrt{2}$
4) $10\sqrt{18}$

25 Express the product of $(1 - 2x)$ and $(3 - 5x)$ as a polynomial in standard form.

26 On the set of axes below, graph $f(x) = |x| - 3$ over the domain $-7 \le x \le 7$.



27 Solve the inequality algebraically: $-4x + 1 > 9 + 3(2x + 1) + x$

28 Solve the formula $A = \frac{1}{2}bh$ for h in terms of A and b.

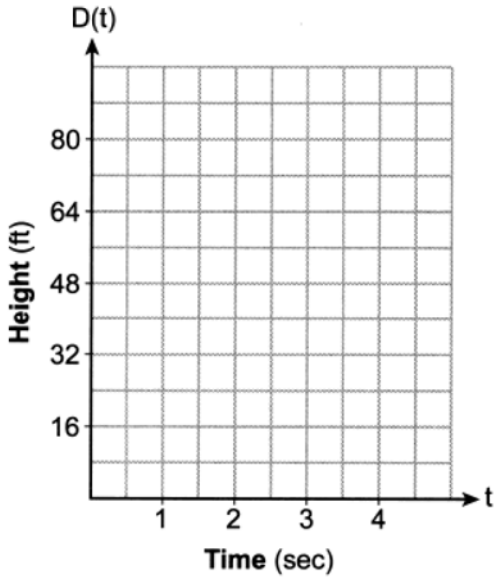
29 The table below shows the population of Manhattan for the years indicated, according to the U.S. Census Bureau.

Year	Population
1970	1,539,233
1980	1,428,285
1990	1,487,536
2000	1,537,195
2010	1,585,873
2020	1,643,734

Determine the average rate of change of the population per year between the years 1980 and 2020, rounded to the *nearest integer*.

30 Rewrite $\frac{5}{\sqrt{3}}$ as a fraction with a rational denominator.

31 A ball is tossed up into the air from the deck of a building. The distance that the ball is above the ground t seconds after it is tossed can be modeled by the function $D(t) = -16t^2 + 32t + 48$, where the distance is measured in feet. On the set of axes below, graph $D(t) = -16t^2 + 32t + 48$.



State the maximum number of feet above the ground that the ball will reach. State the number of seconds after the toss it will take the ball to hit the ground.

32 Solve the following system of equations algebraically for all values of x and y:

$$y = -2x + 3$$

$$y = x^2 - 5x + 3$$

33 The table below shows the number of years of experience, x, working as a salesperson and their corresponding salaries, y, in thousands of dollars.

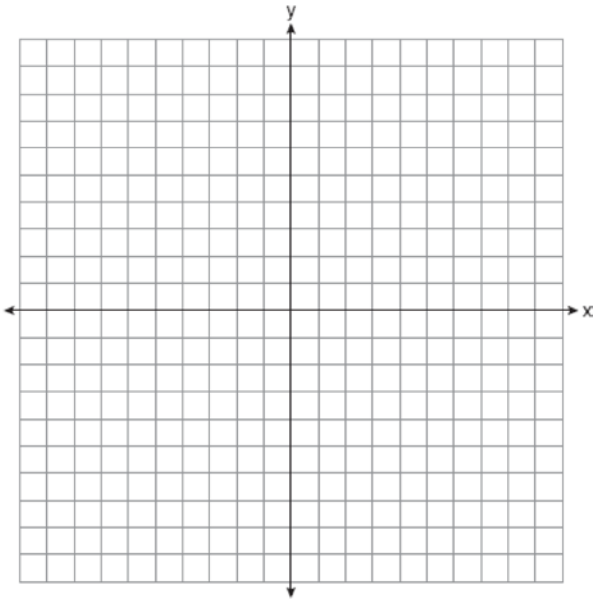
Number of Years of Experience (x)	**Salary in Thousands of Dollars** (y)
2	15
3	28
5	42
9	54
13	64
16	90

State the linear regression equation for these data. Round all values to the *nearest hundredth*. State the correlation coefficient for this data set, to the *nearest hundredth*. State what the correlation coefficient indicates about the linear fit of the data.

34 Graph the system of inequalities on the set of axes below.

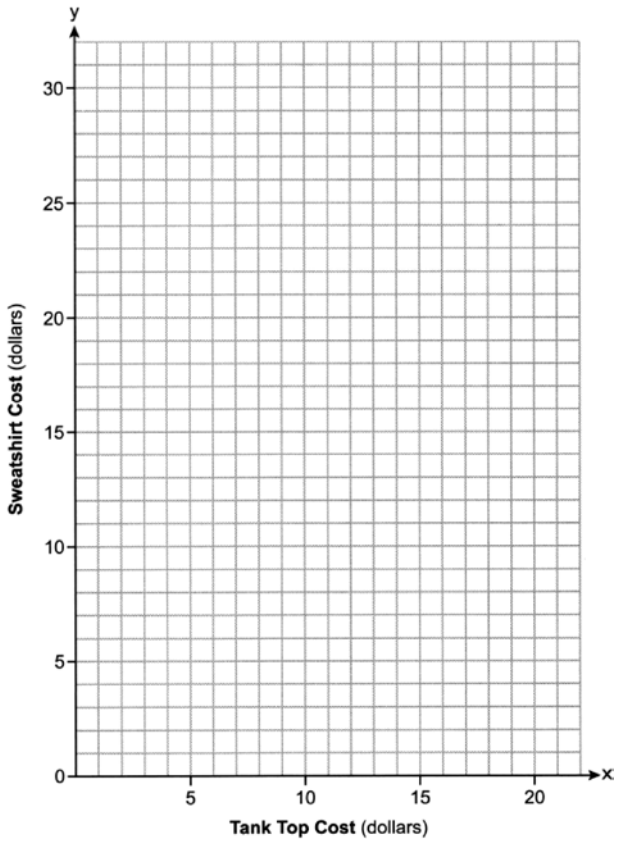
$$2y < x - 8$$

$$3x + y \geq 6$$



State the coordinates of a point that satisfies both inequalities. Justify your answer.

35 At a department store in a tax-free state, Jane can either buy three tank tops and two sweatshirts for $52 or two tank tops and one sweatshirt for $30. If x represents the price of one tank top and y represents the cost of one sweatshirt, write a system of equations that could be used to model this situation. On the set of axes below, graph the system of equations.



State the coordinates of the point of intersection of your lines. Explain what each coordinate of the point of intersection means in the context of the problem.

0626AI
Answer Section

1 ANS: 1
$a_{20} = 4 + (20 - 1)(3) = 61$

PTS: 2 REF: 062601ai NAT: F.BF.A.1 TOP: Sequences

2 ANS: 2
$0.5x - 4 = 8 - x$

$x - 8 = 16 - 2x$

$3x = 24$

$x = 8$

PTS: 2 REF: 062602ai NAT: A.REI.B.3 TOP: Solving Linear Equations

3 ANS: 3 PTS: 2 REF: 062603ai NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares

4 ANS: 2 PTS: 2 REF: 062604ai NAT: F.IF.A.1
TOP: Defining Functions

5 ANS: 3 PTS: 2 REF: 062605ai NAT: A.APR.A.1
TOP: Powers of Powers

6 ANS: 3 PTS: 2 REF: 062606ai NAT: A.SSE.A.1
TOP: Modeling Polynomials

7 ANS: 2 PTS: 2 REF: 062607ai NAT: F.BF.A.1
TOP: Sequences

8 ANS: 1 PTS: 2 REF: 062608ai NAT: S.ID.C.9
TOP: Analysis of Data

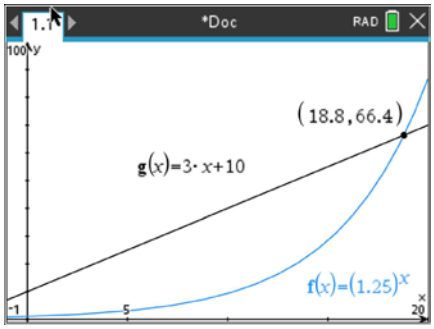
9 ANS: 2 PTS: 2 REF: 062609ai NAT: A.CED.A.1
TOP: Modeling Linear Equations

10 ANS: 4
$h(-1) = (-1)^2 - 3(-1) + 1 = 5$

PTS: 2 REF: 062610ai NAT: F.IF.A.2 TOP: Function Notation

11 ANS: 3 PTS: 2 REF: 062611ai NAT: A.APR.B.3
TOP: Zeros of Polynomials

12 ANS: 2



PTS: 2 REF: 062612ai NAT: F.LE.A.3 TOP: Families of Functions

13 ANS: 2

$$m = \frac{5 - -1}{2 - -2} = \frac{6}{4} = \frac{3}{2}$$

PTS: 2 REF: 062613ai NAT: A.REI.D.10 TOP: Writing Linear Equations
KEY: other forms

14 ANS: 4

$$\frac{40}{20 + 40 + 10} \approx 57\%$$

PTS: 2 REF: 062614ai NAT: S.ID.B.5 TOP: Frequency Tables
KEY: two-way

15 ANS: 4

$$x^2 - 10x = 24$$

$$x^2 - 10x + 25 = 24 + 25$$

$$(x - 5)^2 = 49$$

PTS: 2 REF: 062615ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

16 ANS: 1 PTS: 2 REF: 062616ai NAT: F.BF.B.3
TOP: Transformations with Functions

17 ANS: 4 PTS: 2 REF: 062617ai NAT: A.REI.A.1
TOP: Identifying Properties

18 ANS: 3

$25\% \times 40 = 10$

PTS: 2 REF: 062618ai NAT: S.ID.A.1 TOP: Quartiles and Percentiles

19 ANS: 2 PTS: 2 REF: 062619ai NAT: A.APR.A.1
TOP: Operations with Polynomials KEY: subtraction

20 ANS: 4 PTS: 2 REF: 062620ai NAT: F.LE.B.5
TOP: Modeling Exponential Functions

21 ANS: 4

$$2.5 \text{ rods} \times \frac{5.5 \text{ yds}}{1 \text{ rod}} \times \frac{3 \text{ ft}}{1 \text{ yd}} \times \frac{12 \text{ in}}{1 \text{ ft}} = 495 \text{ in}$$

PTS: 2 REF: 062621ai NAT: N.Q.A.1 TOP: Conversions

22 ANS: 1

$$\frac{3 \pm \sqrt{(-3)^2 - 4(2)(-6)}}{2(2)} = \frac{3 \pm \sqrt{57}}{4}$$

PTS: 2 REF: 062622ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: quadratic formula

23 ANS: 3

$$x = \frac{-8}{2(1)} = -4$$

PTS: 2 REF: 062623ai NAT: F.IF.C.7 TOP: Graphing Quadratic Functions

24 ANS: 3

$$2\sqrt{6} \cdot 5\sqrt{3} = 10\sqrt{18} = 10\sqrt{9} \cdot \sqrt{2} = 30\sqrt{2}$$

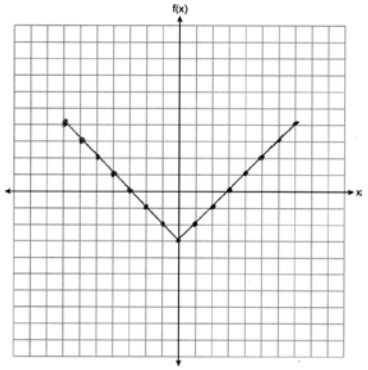
PTS: 2 REF: 062624ai NAT: N.RN.B.3 TOP: Operations with Radicals
KEY: multiplication

25 ANS:

$$(1 - 2x)(3 - 5x) = 3 - 5x - 6x + 10x^2 = 10x^2 - 11x + 3$$

PTS: 2 REF: 062625ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: multiplication

26 ANS:



PTS: 2 REF: 062626ai NAT: F.IF.C.7 TOP: Graphing Absolute Value Functions

27 ANS:

$-4x + 1 > 9 + 3(2x + 1) + x$

$-4x > 8 + 6x + 3 + x$

$-4x > 11 + 7x$

$-11 > 11x$

$-1 > x$

PTS: 2 REF: 062627ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

28 ANS:

$2A = bh$

$\frac{2A}{b} = h$

PTS: 2 REF: 062628ai NAT: A.CED.A.4 TOP: Transforming Formulas
KEY: basic

29 ANS:

$\frac{1643734 - 1428285}{40} = 5386$

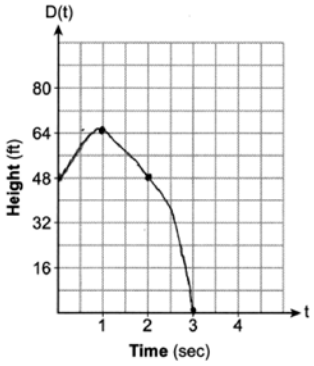
PTS: 2 REF: 062629ai NAT: F.IF.B.6 TOP: Rate of Change

30 ANS:

$\frac{5}{\sqrt{3}} \frac{\sqrt{3}}{\sqrt{3}} = \frac{5\sqrt{3}}{3}$

PTS: 2 REF: 062630ai NAT: N.RN.B.3 TOP: Operations with Radicals
KEY: division

31 ANS:



64, 3

PTS: 4 REF: 062631ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions

32 ANS:

$x^2 - 5x + 3 = -2x + 3$ $y = -2(0) + 3 = 3$ $(0,3),(3,-3)$

$x^2 - 3x = 0$ $y = -2(3) + 3 = -3$

$x(x-3) = 0$

$x = 0,3$

PTS: 4 REF: 062632ai NAT: A.REI.C.7 TOP: Quadratic-Linear Systems

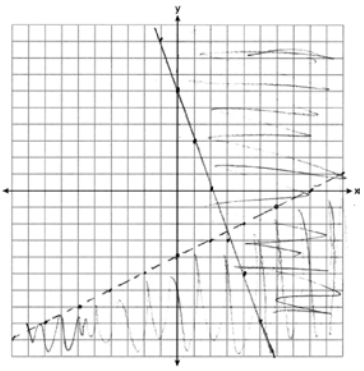
33 ANS:

$y = 4.61x + 11.93$, 0.98, strong

PTS: 4 REF: 062633ai NAT: S.ID.B.6 TOP: Regression

KEY: linear with correlation coefficient

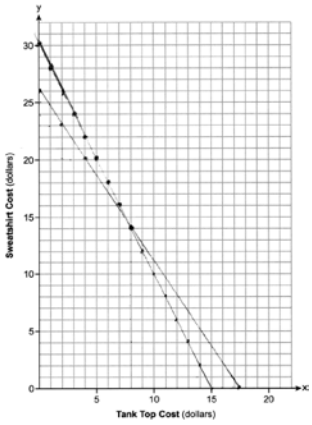
34 ANS:



(10,10) lies in the solution of both inequalities.

PTS: 4 REF: 062634ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

35 ANS:



$3x + 2y = 52$

$2x + y = 30$

(8,14). 8 represents the cost of a tank top and 14 represents the cost of a sweatshirt.

PTS: 6 REF: 062635ai NAT: A.REI.C.6 TOP: Graphing Linear Systems