

Clark County School District

K–12 Mathematics

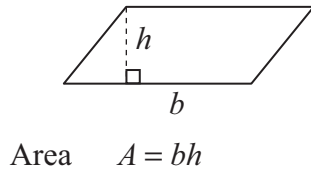


High School Practice Proficiency Examination Spring 2010

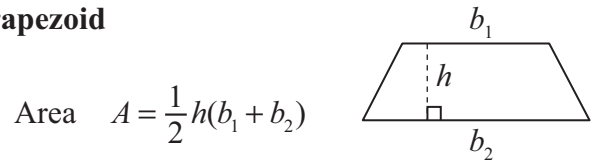
Formula Sheet

Note to Student: You may use these formulas throughout this entire test. Feel free to use this Formula Sheet as needed during your testing time.

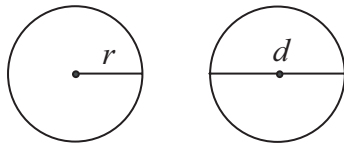
Parallelogram



Trapezoid

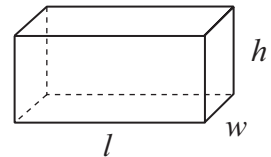


Circle



Circumference $C = 2\pi r$
 $C = \pi d$
 Area $A = \pi r^2$

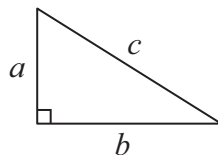
Rectangular Solid



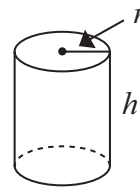
Volume $V = lwh$
 Surface Area $SA = 2lw + 2lh + 2hw$

Pythagorean Theorem

$$a^2 + b^2 = c^2$$

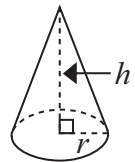


Cylinder



Volume $V = \pi r^2 h$

Cone



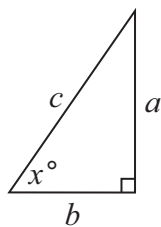
Volume $V = \frac{1}{3}\pi r^2 h$

Trigonometric Ratios

$$\sin x = \frac{a}{c}$$

$$\cos x = \frac{b}{c}$$

$$\tan x = \frac{a}{b}$$



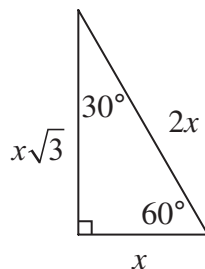
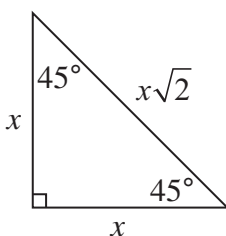
Permutations

$${}_n P_k = \frac{n!}{(n-k)!}$$

Combinations

$${}_n C_k = \frac{n!}{k!(n-k)!}$$

Special Right Triangles



Temperature Formulas

$$^{\circ}F = \frac{9}{5}C + 32$$

$$^{\circ}C = \frac{5}{9}(F - 32)$$

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1. Tony rolls a fair, six-sided die, then tosses a fair coin 2 times. What is the probability he rolls an even number followed by two heads?

- A. $\frac{1}{24}$
- B. $\frac{1}{8}$
- C. $\frac{1}{4}$
- D. $\frac{1}{2}$

2. Which expression is equivalent to $\frac{9x^2 - 27x}{3x}$?

- A. $3(x-3)$
- B. $3(x-3x)$
- C. $3x(3x-9)$
- D. $3x(x-9)$

3. Which best describes a **biased** survey?

- A. Taking a survey at a basketball game about fans' favorite foods to eat while watching a game.
- B. Taking a survey at a high school campus about teenagers' favorite music.
- C. Taking a survey at a vegetarian food market about shoppers' favorite type of chicken.
- D. Taking a survey at a convention of retired persons about good retirement funds.

4. Factor:

$$3x^2 + x - 4$$

- A. $(3x-1)(x+4)$
- B. $(3x+2)(x-2)$
- C. $(3x+4)(x-1)$
- D. $(3x-4)(x+1)$

5. The value of $\sqrt{3} + \sqrt{5}$ is closest to which integer?

- A. 2
- B. 4
- C. 8
- D. 15

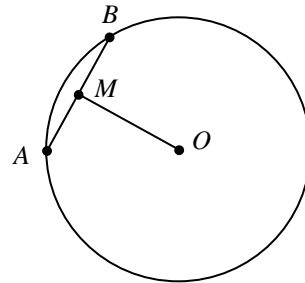
6. The salaries of 12 employees are given below.

\$19,000	\$20,000	\$25,000	\$26,000
\$28,000	\$29,000	\$30,000	\$31,000
\$32,000	\$37,000	\$37,000	\$85,000

The employees are asking for a pay raise. Which **measure of central tendency** should they quote as a justification for their pay raise?

- A. Median, because it represents the lowest measure.
- B. Range, because it represents the highest measure.
- C. Mean, because it includes all salaries when it is calculated.
- D. Mode, because the most people are earning that salary.

7. In the diagram below, M is the midpoint of chord AB on circle O , $AB = 16$ centimeters, and $OM = 15$ centimeters.



What is the radius of circle O ?

- A. 15 cm
- B. 17 cm
- C. 23 cm
- D. 34 cm

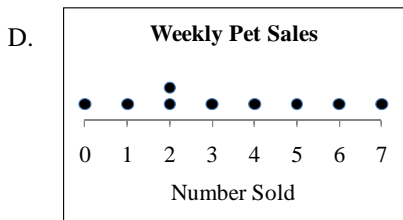
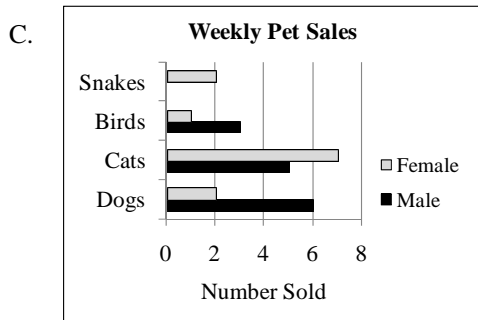
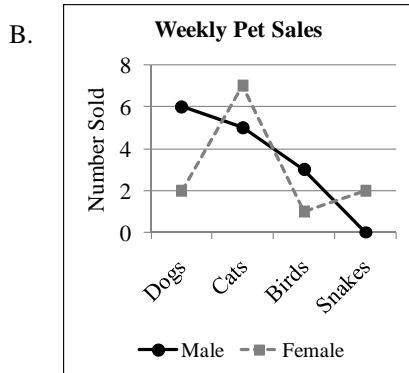
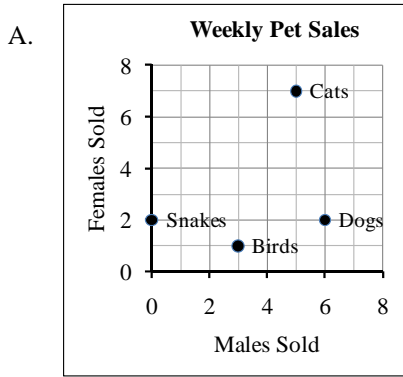
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8. The table below shows the quantities of various types of pets, by gender, sold at a pet store during a one-week period.

	Male	Female
Dogs	6	2
Cats	5	7
Birds	3	1
Snakes	0	2

Which graph best describes the sales information given in the table?



9. Which measurement of length is the most precise?

- A. centimeter
- B. kilometer
- C. meter
- D. millimeter

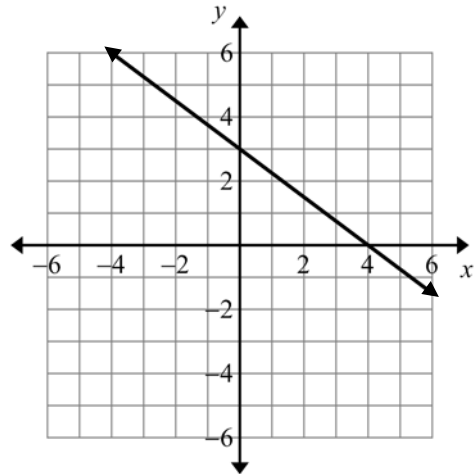
10. An inequality is shown below.

$$\frac{p}{2} \geq \frac{10}{x}$$

Which shows the inequality correctly solved for x , when $x > 0$?

- A. $x \geq \frac{20}{p}$
- B. $x \leq \frac{20}{p}$
- C. $x \geq 5p$
- D. $x \leq 5p$

11. The graph of a linear equation is shown below.



What is the slope of a line perpendicular to the given line?

- A. $-\frac{4}{3}$
- B. $-\frac{3}{4}$
- C. $\frac{3}{4}$
- D. $\frac{4}{3}$

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12. The equation below illustrates a property of real numbers.

$$9 + 0 = 0 + 9 = 9$$

Which property is illustrated by the equation?

- A. additive identity property
 - B. additive inverse property
 - C. associative property
 - D. distributive property
13. The cafeteria sells bagged lunches. Each randomly packed bag contains a sandwich, a vegetable, and a drink. The quantities of each item produced are given below.

sandwiches: equal numbers of turkey, ham, tuna, or peanut butter

vegetables: equal numbers of carrots or celery

drinks: equal numbers of apple juice, grape juice, or milk

A student randomly chooses a bagged lunch. What is the approximate probability that he got his favorite lunch: a ham sandwich, carrots, and apple juice?

- A. 4%
 - B. 6%
 - C. 11%
 - D. 17%
14. A function and its domain are shown below.

$$g(x) = 2x - 1$$

Domain: {1, 2, 3}

What is the range of the function?

- A. $\left\{0, \frac{1}{2}, 1\right\}$
- B. $\left\{\frac{1}{2}, 1\frac{1}{2}, 2\right\}$
- C. {1, 2, 3}
- D. {1, 3, 5}

15. Jodi stacks five different colored blocks in a tower.

- The green block is below the yellow block and above the blue block.
- The blue block is between the yellow and the red blocks.
- The orange block is below the green and not touching the blue block.

Which correctly lists the colors of blocks from top to bottom?

- A. green, red, orange, yellow, blue
 - B. red, green, blue, orange, yellow
 - C. yellow, blue, red, green, orange
 - D. yellow, green, blue, red, orange
16. Anthropologists examining remains can determine the approximate height of a person by measuring the femur (thigh bone). The table below shows the approximate heights of adult females based on the lengths of their femurs.

Femur Length (cm)	Approximate Height (cm)
30	136
34	146
40	161
42	166
46	176

The relationship between femur length and height continues. What is the approximate height of an adult female whose femur measures 55 centimeters?

- A. 184 cm
 - B. 198 cm
 - C. 210 cm
 - D. 250 cm
17. The temperature in San Diego is 86° Fahrenheit. What is the approximate equivalent temperature in Celsius?
- A. 16° C
 - B. 30° C
 - C. 66° C
 - D. 97° C

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18. Subtract.

$$\begin{bmatrix} 2 & -4 \\ 3 & 0 \end{bmatrix} - \begin{bmatrix} 0 & 2 \\ -3 & -5 \end{bmatrix}$$

A. $\begin{bmatrix} 0 & -8 \\ -9 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 2 & -2 \\ 0 & -5 \end{bmatrix}$

C. $\begin{bmatrix} 2 & -6 \\ 6 & 5 \end{bmatrix}$

D. $\begin{bmatrix} 2 & 2 \\ 0 & 5 \end{bmatrix}$

19. A pattern of numbers is shown below.

$$\begin{array}{ccccccc} & & & & & & 1 \\ & & & & & & 1 & 1 \\ & & & & & & 1 & 2 & 1 \\ & & & & & & 1 & 3 & 3 & 1 \\ & & & & & & ? & ? & ? & ? & ? \\ & & & & & & 1 & 5 & 10 & 10 & 5 & 1 \end{array}$$

Which list of numbers shows the missing line?

A. 1 4 10 4 1

B. 1 4 6 4 1

C. 1 4 4 4 1

D. 1 4 3 4 1

20. Tara and Brian leave a concert at 11:30 pm. They travel in opposite directions. Tara drives 55 miles per hour and Brian drives 45 miles per hour. At what time will they be 150 miles apart?

A. 12:00 a.m.

B. 12:10 a.m.

C. 1:00 a.m.

D. 1:20 a.m.

21. Look at the equation below.

$$x + 4 = y$$

Which expression is equal to $2x + 8$?

A. $y + 4$

B. $y + 8$

C. $2y$

D. $2y + 4$

22. A system of equations is shown below.

$$\begin{cases} x + 5y = -13 \\ 2x - y = 7 \end{cases}$$

What is the value of y in the solution of the system of equations?

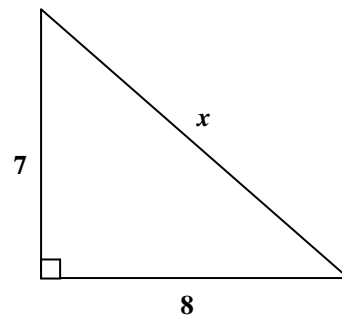
A. $y = -\frac{11}{5}$

B. $y = -\frac{7}{3}$

C. $y = -2$

D. $y = -3$

23. A right triangle is shown below.



Which equation represents the value of x ?

A. $x = 7^2 + 8^2$

B. $x = 8^2 - 7^2$

C. $x = \sqrt{7^2 + 8^2}$

D. $x = \sqrt{8^2 - 7^2}$

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24. Eight swimmers are competing in a race. How many different ways could the swimmers place 1st, 2nd, and 3rd?
- A. 24
 - B. 56
 - C. 336
 - D. 512

25. A student rolled a pair of fair, six-sided, dice sixty times and recorded the sums in the frequency table below.

2	
3	
4	
5	I
6	II
7	III
8	III
9	I
10	
11	
12	

Which comparison is true about the theoretical probability of rolling a sum of 7 and the student's experimental results of rolling a sum of 7?

- A. The theoretical probability is less than the experimental probability.
- B. The theoretical probability is greater than the experimental probability.
- C. The theoretical and experimental probabilities are equal.
- D. There is insufficient information to compare the theoretical and experimental probabilities.

26. Three expressions are shown below.

$$\sqrt{n} \quad n \quad n^2$$

Which expression is correct when $0 < n < 1$?

- A. $\sqrt{n} < n < n^2$
- B. $n^2 < n < \sqrt{n}$
- C. $n < \sqrt{n} < n^2$
- D. $n < n^2 < \sqrt{n}$

27. The first four terms of a sequence are shown below.

$$-5 \quad -2 \quad 1 \quad 4$$

The sequence continues. Which sentence describes each subsequent term of the sequence?

- A. The next term will be four times the previous term.
 - B. The next term will be eight more than twice the previous term.
 - C. The next term will be three less than the previous term.
 - D. The next term will be three more than the previous term.
28. The swing period (p) of a pendulum, in seconds, is related to its length (L), in centimeters, by the equation below.

$$L = 25p^2$$

A scientist wants to decrease the swing period of a 400-centimeter pendulum by one second. How should the scientist change the length of the pendulum?

- A. Decrease its length by 25 centimeters.
 - B. Increase its length by 25 centimeters.
 - C. Decrease its length by 175 centimeters.
 - D. Increase its length by 225 centimeters.
29. The table below shows the advertised and allowable weights of four brands of cereal when their boxes are filled.

Brand	Advertised Weight	Allowable Minimum Weight	Allowable Maximum Weight
A	12 oz	10.7 oz	13.3 oz
B	16 oz	14.9 oz	17.1 oz
C	20 oz	18.5 oz	21.5 oz
D	24 oz	22.7 oz	25.3 oz

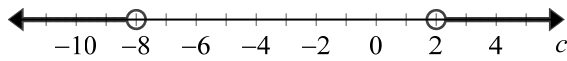
Which brand of cereal has the smallest allowable weight tolerance when filled?

- A. Brand A
- B. Brand B
- C. Brand C
- D. Brand D

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30. The graph below represents the solution set of an inequality.



Which of these is the inequality?

- A. $|c - 3| > 5$
 B. $|c - 3| < 5$
 C. $|c + 3| > 5$
 D. $|c + 3| < 5$
31. Mr. Garcia asked the students in one of his honors math classes to rank how much they enjoy working on math problems. The students were asked to use the following scale.

Hate	Dislike	Neutral	Like	Love
1	2	3	4	5
6	7	8	9	10

All students in the class responded and the mean was 8. Does this support the claim that all honors math students enjoy working on math problems?

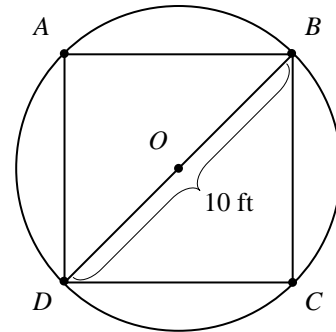
- A. Yes, because honors students are good at math.
 B. Yes, because Mr. Garcia took a census of the entire class.
 C. No, because the mean might have been affected by a few students selecting 10 as their ranking.
 D. No, because Mr. Garcia's class may not be representative of all honors math classes.
32. An equation is shown below.

$$P = k(T^2 - n^2)$$

Which is an equivalent equation solved for T ?

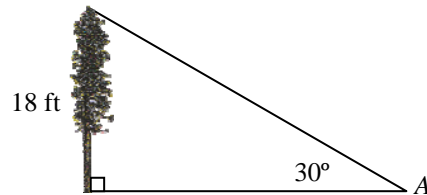
- A. $T = \pm \sqrt{\frac{P}{k}} + n$
 B. $T = \pm \sqrt{\frac{P}{k} + n^2}$
 C. $T = \pm \sqrt{\frac{P + n^2}{k}}$
 D. $T = \pm \sqrt{P + n^2 - k}$

33. In the diagram below, square $ABCD$ is inscribed inside circle O . The diameter of circle O is 10 feet.



What is the area of square $ABCD$?

- A. 10 ft^2
 B. 50 ft^2
 C. 100 ft^2
 D. 200 ft^2
34. The top of an 18-foot tall tree is at an angle of elevation of 30° from a point A on level ground.



How far from the base of the tree is point A ?

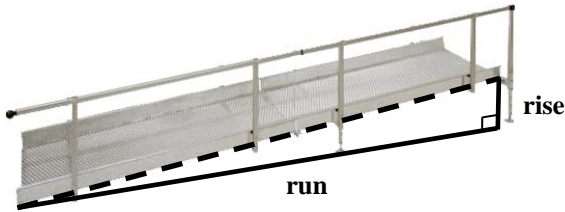
- A. 18 ft
 B. $18\sqrt{2}$ ft
 C. $18\sqrt{3}$ ft
 D. 36 ft

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35. The Americans with Disabilities Act requires that wheelchair ramps have a slope between $\frac{1}{8}$ and $\frac{1}{12}$.

A diagram of a wheelchair ramp is shown below.



Which diagram represents a ramp that meets the slope requirement?

- A. 2 ft
18 ft
- B. 4 ft
14 ft
- C. 4 ft
12 ft
- D. 2 ft
12 ft

36. The stem-and-leaf plot below shows a student's times taken to complete 14 homework assignments over a three-week period.

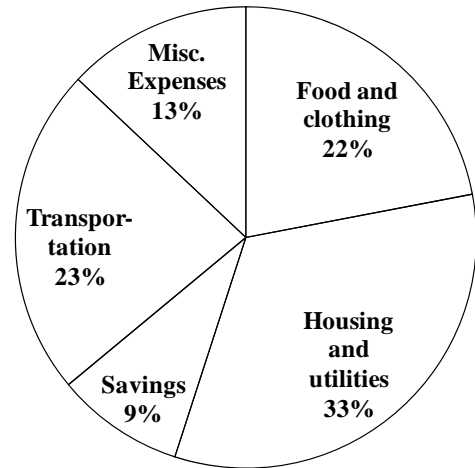
3	5 6 6 7 9
4	1 1 4 5 7
5	0 4 5 8

Key 5|0 = 50 minutes

What is the **range** of the times taken to complete the homework assignments?

- A. 11 minutes
B. 15 minutes
C. 19 minutes
D. 23 minutes

37. The graph below represents the percentages of total spending in Amy's personal budget.



Amy receives a pay increase and decides to put the entire amount into the savings category. When she does this, how will the sizes of the graph's sectors be affected?

- A. The sectors will remain the same because there will be the same number of categories.
- B. The sectors will remain the same because the percentage in each category will remain the same.
- C. The sectors will change because the percentage of savings will increase and the percentages in the other categories will decrease.
- D. The sectors will change because the percentage in each category will increase.
38. An expression is shown below.

$$\left(\frac{x \cdot y}{3}\right)^2$$

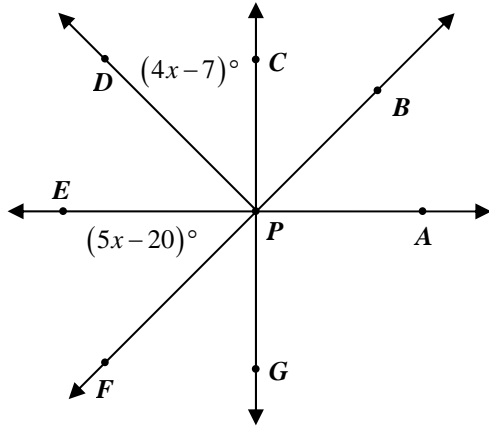
What is the value of the expression when $x = \sqrt{9^2}$ and $y = \sqrt[3]{64}$?

- A. 12
B. 64
C. 144
D. 432

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39. In the diagram below, $\angle DPC$ and $\angle EPF$ are congruent and complementary.



What is the value of x ?

- A. 3
- B. 13
- C. 23
- D. 37

40. The table below is the menu at a snack stand.

Refreshments	Price
Pizza	\$2.00
Cookies	\$1.00
Ice Cream	\$1.00
Popcorn	\$1.25
Hot Dogs	\$2.00
Granola Bars	\$1.00
Soda	\$1.25
Bottled Water	\$0.50

A new item is added to the menu which changes the median price to \$1.25, but does **not** change the mean price. What is the price of the new item?

- A. \$1.00
- B. \$1.25
- C. \$1.50
- D. \$2.00

Spring 2010 Practice HSPE & Solution Key and Answers

1. $P(\text{even \#}) = 3/6$ $P(2 \text{ heads}) = 1/4$

$$P(\text{even, H, H}) = \frac{1}{2} \cdot \frac{1}{4} = \frac{1}{8}$$

ANSWER – B

2. $9x(x - 3)/3x = 3(x - 3)$

ANSWER –A

3. **Vegetarians don't eat meat**

ANSWER – C

4. $3x^2 + x - 4,$

Using the ac method that gives you $(3)(-4) = -12$, find factors that add to +1.

4 and -3. Rewriting $3x^2 + x - 4$ using those coefficients for the linear term, we have $3x^2 + 4x - 3x - 4$. Now factor by grouping the 1st two terms and the last two terms.

$$x(3x + 4) - 1(3x + 4) = (3x + 4)(x - 1)$$

ANSWER – C

5. $\sqrt{3} + \sqrt{5} \sim 1^+ + 2^+$. The answer is greater than 3

ANSWER – B

6. **ANSWER – A**

7. **Connecting O to B results in a right triangle AMO. Use Pythagorean Thm to find the hypotenuse AO which is also the radius.**

If AB = 16, then AM = 8

$$(AO)^2 = 8^2 + 15^2$$

$$= 64 + 225$$

$$= 289$$

$$AO = \sqrt{289} = 17$$

ANSWER – B

8. **Match the information in the chart to the graphs and choose the graph that exhibits the information that is easiest to understand.**

ANSWER – C

9. **The smallest MEASURE**

ANSWER – D

10. **When x is positive, we don't have to worry about the order of the inequality when multiplying or dividing by x.**

$$\frac{p}{2} \geq \frac{10}{x}, \text{ the reciprocal changes the order of the inequality; } \frac{2}{p} \leq \frac{x}{10}$$

$$\text{Mult both sides by 10, } \frac{20}{p} \leq x$$

ANSWER – A

11. $m = \frac{\Delta y}{\Delta x}$. The x intercept is (4, 0), the y intercept is (0, 3).

I count down 3 or (-3) and go over 4, the slope is $-3/4$.

Perpendicular lines have negative reciprocal slopes.

ANSWER – D

12. Properties of Real Numbers

ANSWER – A

13. Probability = $\frac{\text{success}}{\text{total}}$. 4 choices of sandwiches, 2 choices of veg and 3 choices of drink. Using the Fundamental Counting Principle, $4 \times 2 \times 3 = 24$ total possibilities. He has one chance out of 24 which approximates 4%.

ANSWER – A

14. Substitute numbers in the domain for x and find the values of y – the range.

ANSWER – D

15. Follow direction and list the blocks vertically – leaving spaces to fill in other blocks OR look at each answer to see which works.

ANSWER – D

16. Each cm of femur growth approximates 2.5 cm of height. A 46 cm femur to a 55 cm femur is a growth of 9 cm, each cm adding 2.5 or 22.5 cm to the height at 176. That approximates 198.

ANSWER – B

17. Use formula from formula sheet, $C = 5/9(F - 32)$ & substitute

$$\begin{aligned} C &= 5/9(86 - 32) &&= 5/9(54) \\ &&&= 30 \end{aligned}$$

ANSWER – B

18. Subtract the row and column from each matrix, R1C1, R1C2, etc

ANSWER – C

19. Follow the pattern

ANSWER – B

20. DISTANCE TARA = $55x$ DISTANCE BRIAN = $45x$

Total DISTANCE = 150 miles

$$55x + 45x = 150$$

$$100x = 150$$

$x = 1 \frac{1}{2}$ hours. Leaving at 11:30, it will be 1 am

ANSWER – C

21. Multiply both sides by 2

ANSWER – C

$$\begin{array}{rcl}
 22. & x + 5y = -13 & x(-2) \rightarrow -2x - 10y = 26 \\
 & 2x - y = 7 & \underline{2x - y = 7} \\
 & & -11y = 33 \\
 & & y = -3
 \end{array}$$

ANSWER – D

$$\begin{array}{l}
 23. \quad \text{Use Pythagorean Thm; } c^2 = a^2 + b^2 \\
 x^2 = 7^2 + 8^2 \\
 x = \sqrt{7^2 + 8^2}
 \end{array}$$

ANSWER – C

$$24. \quad \text{Using the Fundamental Counting Principle; } 8 \times 7 \times 6 = 336$$

ANSWER – C

$$25. \quad P(\text{TH.SUM OF 7}) = 6/36 = 1/6 \quad P(\text{EXP. OF 7}) = 15/60 = 1/4$$

ANSWER – A

$$26. \quad \text{Substitute an easy fraction like } \frac{1}{4} \text{ for } n.$$

ANSWER – B

27. **PATTERN, adding 3**

ANSWER – D

28.	$L = 25p^2$	$400 = 25p^2$	$L = 25(3)^2$
		$16 = p^2$	$L = 25 (9)$
		$4 \text{ seconds} = p$	$L = 225$

$$400 - 225 = 175$$

ANSWER – C

29. **Subtract adv weight and max or min. Brand A 1.3, Brand B 1.1, Brand C 1.5, Brand D 1.3**

ANSWER – B

30. **Solve the inequality, eliminate answers B and D because they would typically meet in the middle (look like a dumbbell). Looking only at the positive values of the expression in absolute value, we need a (+2) as a solution.**

ANSWER – C

31. **ANSWER – D**

32. $P = k(T^2 - n^2)$

$$\frac{P}{k} = T^2 - n^2$$

$$\frac{P}{k} + n^2 = T^2$$

$$\pm \sqrt{\frac{P}{k} + n^2} = T$$

ANSWER – B

33. If the diameter 10 ft, in a 45-45-90° triangle, the hypotenuse is $\sqrt{2}$ times the leg or the leg is the hypotenuse divided by $\sqrt{2}$.

$$\frac{10}{\sqrt{2}} \frac{\sqrt{2}}{\sqrt{2}} = \frac{10\sqrt{2}}{2} = 5\sqrt{2}. \text{ Each leg is } 5\sqrt{2}.$$

$$A = s^2; 5\sqrt{2} \ 5\sqrt{2} = 25 (2) = 50$$

ANSWER – B

34. In a 30-60-90° triangle, the longer side is the $\sqrt{3}$ times the shorter side.

ANSWER – C

35. $2/18 = 1/9$

ANSWER – A

36. Range is difference between top and low score; 58 and 35

ANSWER – D

37. She will have a larger percentage in savings

ANSWER – C

38. Substitute $x = 9$ and $y = 4$ into the expression

ANSWER – C

39. Complementary \angle s - Two \angle s whose sum is 90°

$$(4x - 7) + (5x - 20) = 90$$

$$9x - 27 = 90$$

$$9x = 117$$

$$x = 13$$

ANSWER – B

40. The mean of the original is \$1.25, the median was \$1.125. To keep the mean the same, we have to add the mean. The median then changes to \$1.25.

ANSWER – B