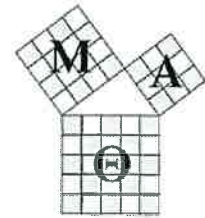


Name: Key 2024

School: _____

Grade: _____ Form A



Round 2: Multiple Choice Test

Rules:

1. You will have 60 minutes to complete the exam.
2. The exam consists of 30 problems each with four choices.
3. Each correct answer is worth 6 points and **there is NO penalty for guessing** so you should answer every problem!
4. No calculators, phones, smartwatches, or any other aids are allowed during the test.
5. If you finish before time is called, review your answers. When time is called, stop and put your pencil down. You may not answer any more questions after this point.
6. Figures are not necessarily drawn to scale.
7. Be sure to transfer your answers to your scantron. We will collect the scantron but you are free to keep this multiple choice test.
8. Do all of your work on your test, but if you need additional scratch paper or a pencil during the test, please raise your hand.
9. At this time, please be sure your name, grade, and school is on this test as well as on your scantron sheet.

MC Problems:

1) If the perimeter of a square is 72cm, what is the length of each side?

- A) 18 cm B) 9 cm C) 36cm D) 288 cm

$$4x = 72$$

$$x = 18$$

2) Write 76% as a fraction in simplest form.

- A) $\frac{38}{5}$ B) $\frac{3}{7}$ C) $\frac{19}{25}$ D) $\frac{6}{25}$

$$\frac{76}{100} \rightarrow \frac{19}{25}$$

3) How many pints are in 6 gallons?

- A) 12 B) 24 C) 48 D) 96

8 pints in 1 gallon

$$6 \text{ gallons} \times \frac{8 \text{ pints}}{\text{gallon}} = 48 \text{ pints}$$

4) $\frac{2x4x5y6x7}{7y6x8x4x3} = 1$

- A) 0 B) 0.2520 C) 1 D) 2520

5) $\sqrt{9} + \sqrt{81} = \sqrt{9+81+?}$

- A) 0 B) 54 C) 90 D) 144

$$3 + 9 = \sqrt{90+x}$$

$$12 = \sqrt{90+x}$$

$$12^2 = (\sqrt{90+x})^2$$

$$144 = 90 + x$$

$$54 = x$$

6) Simplify: $1 + \frac{3}{1 + \frac{1}{1 + \frac{1}{1+2}}}$ $\rightarrow 1 + \frac{3}{1 + \frac{3}{4}}$ $\rightarrow 1 + \frac{3}{\frac{7}{4}}$
 $\rightarrow 1 + 3 \cdot \frac{4}{7}$
 $\rightarrow 1 + \frac{12}{7} \rightarrow \frac{7}{7} + \frac{12}{7} = \frac{19}{7}$

A) 4 B) $\frac{16}{7}$ **C) $\frac{19}{7}$** D) $\frac{3}{7}$

7) Find the number of seconds in 3.5 hours.

- A) 210 B) 3600 C) 10,800 **D) 12,600**

$3.5 \text{ hours} \times \frac{60 \text{ mins}}{1 \text{ hr}} \times \frac{60 \text{ secs}}{1 \text{ min}} \rightarrow 12,600$

8) What is the missing value, N, in the equation $2\frac{1}{4} + \frac{3}{N} = 2\frac{5}{8}$?

- A) 6 B) 7 **C) 8** D) 10

$\frac{9}{4} + \frac{3}{N} = \frac{21}{8}$ $\frac{3}{N} = \frac{21}{8} - \frac{18}{8}$ $N = 8$
 $\frac{18}{8} + \frac{3}{N} = \frac{21}{8}$ $\frac{3}{N} = \frac{3}{8}$

9) The greatest common factor of 48 and 72 is

- A) 4 B) 8 C) 12 **D) 24**

factors of 48: factors of 72:

- 1, 48
- 2, **24**
- 3, 16
- 4, 12
- 6, 8

- 1, 72
- 2, 36
- 3, **24**
- 4, 18
- 6, 12
- 8, 9

10) What are the odds of getting one head and two tails (in any order) after three coin flips?

A) $\frac{1}{2}$

B) $\frac{3}{8}$

C) $\frac{1}{3}$

D) $\frac{1}{4}$

There are 3 ways to get one H and two T (HTT, THT, TTH)
There are 8 total possible results after 3 coin flips ($2 \times 2 \times 2 = 8$)

Answer is $\frac{3}{8}$

11) For the following equation $3x - 6 = \frac{16}{3x-6}$ solve for x.

A) $\frac{15}{7}$

B) $\frac{3}{10}$

C) $\frac{10}{3}$

D) $\frac{11}{5}$

$$\frac{\cancel{3x-6}}{1} = \frac{\cancel{16}}{\cancel{3x-6}} \quad \left| \quad \begin{array}{l} (3x-6)^2 = 16 \\ \sqrt{(3x-6)^2} = \sqrt{16} \\ 3x-6 = 4 \end{array} \right.$$

12) A team won 40 of its first 50 games. How many of the remaining 40 games must this team win so it will have won exactly 70% of its games for the season?

A) 20

B) 23

C) 28

D) 30

There are 90 total games (first 50 + 40 remaining ones)

$$\frac{40+x}{90} = \frac{7}{10}$$

$$10(40+x) = 7(90)$$

$$400 + 10x = 630$$

$$10x = 230$$

$$x = 23$$

13) Evaluate $f(-2) - g(7)$, given that $f(x) = 8x^2 - 32$ and $g(x) = 5 - 3x$

A) -48

B) 16

C) 20

D) -18

$$f(-2) = 8(-2)^2 - 32 = 0$$

$$g(7) = 5 - 3(7) = -16$$

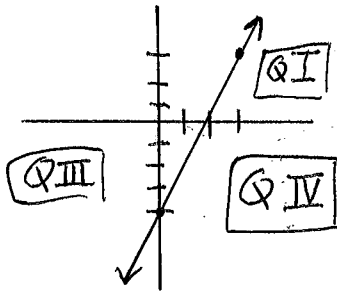
$$0 - (-16) = 16$$

14) The graph of the equation $y = \frac{7}{3}x - 4$ passes through which quadrants?

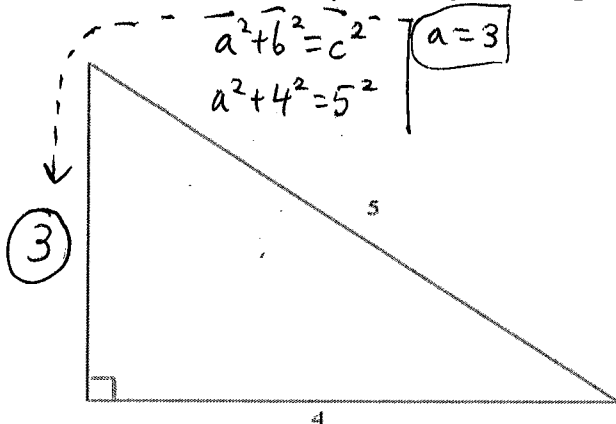
- I. Quadrant 1
- II. Quadrant 2
- III. Quadrant 3
- IV. Quadrant 4

$y = mx + b$ slope: $m = \frac{7}{3}$
 y-intercept: $b = -4$

- A) I B) I, II, III **C) I, III, IV** D) All of the Quadrants



15) What is the area of this right triangle?



Area = $\frac{1}{2}bh$
 $A = \frac{1}{2}(4)(3)$
A = 6

- A) 3 **B) 6** C) 9 D) 20

16) If Roberto has \$0.37 composed of quarters, dimes, nickels, and pennies, what is the least number of pennies that he could have? (Note that he doesn't necessarily have any quarters, dimes or nickels)

- A) 2** B) 7 C) 12 D) 37

Example: 1 quarter : 25 cents
 1 dime : 10 cents
 2 pennies : + 2 cents

 37 cents

17) Lauren wants to boost her grade from an 88 to a 90 in biology. Currently, her test scores are 80, 95, 79, and 98. What must Lauren earn on the last test to raise her grade to a 90?

A) 88

B) 92

C) 95

D) 98

$$\frac{80 + 95 + 79 + 98 + x}{5} = 90 \quad \left| \quad \frac{352 + x}{5} = \frac{90}{1} \quad \right| \quad x = 98$$

$$352 + x = 450$$

18) Húhntér wakes up at 4:36 am every morning but today wakes up exactly 75 minutes later. At what time does he wake up today?

A) 5:36

B) 5:41

C) 5:51

D) 4:11

75 minutes is 1 hour and 15 minutes

4:36 am → 5:36 am → 5:51 am

1 hr
15 mins

19) A product of 3 consecutive positive integers

A) Is always divisible by 2 but may not be divisible by 3

B) Is always divisible by 3 but may not be divisible by 2

C) Is always divisible by 6 but may not be divisible by 12

D) Is always divisible by 12

Test some examples:

$1 \times 2 \times 3 = 6$ ← divisible by 6 → but not divisible by 12
 $2 \times 3 \times 4 = 24$
 $3 \times 4 \times 5 = 60$
 $4 \times 5 \times 6 = 120$

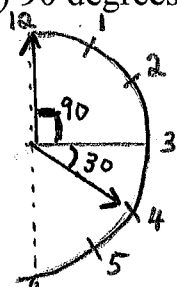
20) Johanna's watch stopped at exactly 4:00. What was the measure (in degrees) of the smaller angle formed by the hour and minute hands?

A) 90 degrees

B) 100 degrees

C) 120 degrees

D) 150 degrees



*consecutive numbers form 30 degrees

$90 + 30 = 120$

21) What is the product of the mean and median of the first 4 prime numbers?

A) 6.875

B) 8.25

C) 16

D) 17

2, 3, 5, 7

mean is $\frac{2+3+5+7}{4} = \frac{17}{4}$ | median is 4

$\frac{17}{4} \times 4 = \mathbf{17}$

22) What number is in the ones digit in 3^{26} ?

A) 3

B) 7

C) 8

D) 9

$3^1 \rightarrow 3$
 $3^2 \rightarrow 9$
 $3^3 \rightarrow 27$
 $3^4 \rightarrow 81$
 $3^5 \rightarrow 243$

* pattern repeats between numbers of 3, 9, 7, 1 (4 numbers)
 * Divide 26 by 4 and look for the remainder

R1 means 3
 R2 means 9
 R3 means 7
 R0 means 1

$4 \overline{) 26} \begin{array}{r} 6 \\ -24 \\ \hline 2 \end{array}$ R2

Remainder 2 means 9

23) Solve $x = \sqrt{6 + \sqrt{6 + \sqrt{6 + \dots}}}$

A) 3

B) 2

C) $\sqrt{6}$

D) -6

$x = \sqrt{6 + x}$

$x^2 = (\sqrt{6+x})^2$

$x^2 = 6 + x$

$x^2 - x - 6 = 0$

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

$x-3=0$ | $x+2=0$

$x=3$ | ~~$x=-2$~~

24) Which equation is perpendicular to the line represented by $3x - 5y = 30$ and passes through the point (4, 3)?

A) $3x + 5y = 29$

B) $3x - 5y = -3$

C) $5x + 4y = 29$

D) $5x + 3y = 29$

$30 = 3x - 5y$ | slope of line is $\frac{3}{5}$

$5y = 3x - 30$ | perpendicular to slope $\frac{3}{5}$ is $-\frac{5}{3}$

$y = \frac{3}{5}x - \frac{30}{5}$ | point: (4, 3)

$y = \frac{3}{5}x - 6$ | new slope: $m = -\frac{5}{3}$

$y - y_1 = m(x - x_1)$

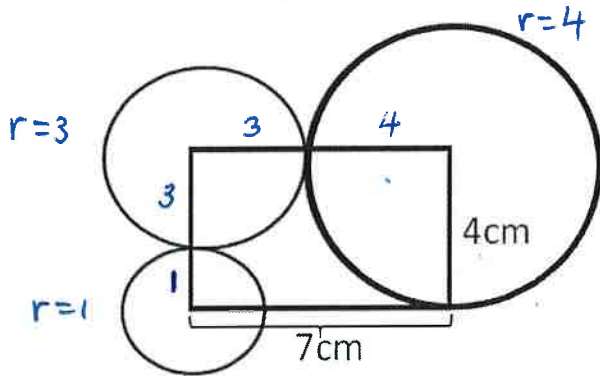
$y - 3 = -\frac{5}{3}(x - 4)$

$(y - 3 = -\frac{5}{3}x + \frac{20}{3}) \cdot 3$

$3y - 9 = -5x + 20$

$5x + 3y = 29$

25) Find the sums of the circumference of the three circles below: ($C = 2\pi r$)



small circle : $2\pi(1)$
 medium circle : $2\pi(3)$
 large circle : $2\pi(4)$

$$\left. \begin{array}{l} 2\pi \\ 6\pi \\ + 8\pi \end{array} \right\} \boxed{16\pi}$$

A) 14π

B) 16π

C) 18π

D) 20π

26) Robbie and Bobby are best friends. Robbie is 25 years less than double of Bobby's age. In 7 years, Robbie will be 5 years more than Bobby's current age. What are their ages? *B is Bobby's current age R is Robbie's current age*

A) 15, 27

B) 9, 12

C) 21, 23

D) 20, 15

$$\begin{array}{l} 2B - 25 = R \\ R + 7 = B + 5 \\ R + 2 = B \end{array} \left| \begin{array}{l} 2(R+2) - 25 = R \\ 2R + 4 - 25 = R \\ R - 21 = 0 \\ R = 21 \end{array} \right| \begin{array}{l} R + 2 = B \\ 21 + 2 = B \\ 23 = B \end{array}$$

27) In planet Swæy-Zi, 5 yorkpops equals 2 quizzikals. 4 quizzikals equals 8 hurtlaks and 3 hurtlaks equals 17 Earth dollars. How many earth dollars is 6 yorkpops?

A) \$23.45

B) \$17.25

C) \$15.50

D) \$27.20

$$6 \text{ yorkpops} \times \frac{2 \text{ quizz.}}{5 \text{ york.}} \times \frac{8 \text{ hurt.}}{4 \text{ quizz.}} \times \frac{17 \text{ dollars}}{3 \text{ hurt.}} = \$27.20$$

28) If $3^x = 11$ and $11^y = 27$ then what is xy ?

A) 2

B) 3

C) 4

D) 5

$$3^x = 11 \left\{ \begin{array}{l} 11^y = 27 \\ (3^x)^y = 27 \end{array} \right. \left| \begin{array}{l} 3^{xy} = 27 \\ 3^{xy} = 3^3 \end{array} \right. \left| \boxed{xy = 3}$$

29) On a number line, two different integers are each the same distance from my favorite integer and have a sum of 144. What is my favorite integer?

A) 31

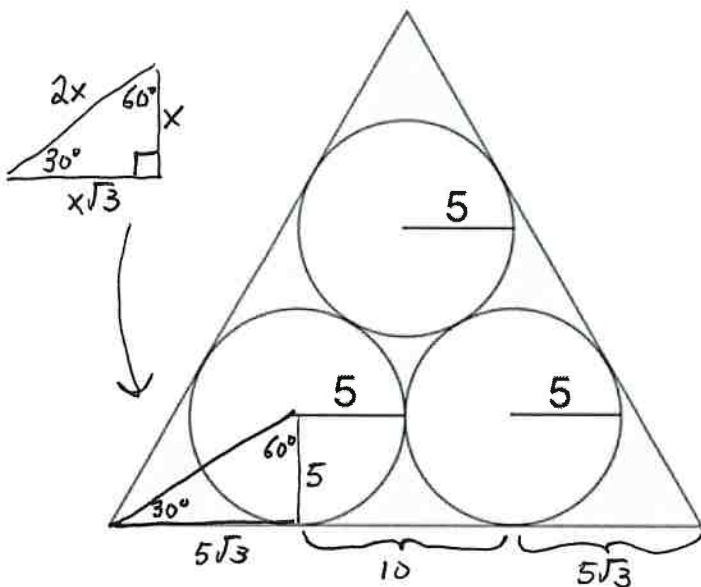
B) 36

C) 48

D) 72

$$\frac{144}{2} = 72 \left| \begin{array}{l} \text{Any 2 different numbers that are the same distance apart from 72 will add to be 144.} \\ \text{Ex: } 71 + 73 = 144 \quad 68 + 76 = 144 \\ \quad \quad 70 + 74 = 144 \quad 65 + 79 = 144 \end{array} \right.$$

30) Find the perimeter of the triangle approximated to the nearest whole number.



$$\begin{aligned} \text{Perimeter} &= 3 \cdot (10 + 10\sqrt{3}) \\ &\approx 81.96 \end{aligned}$$

A) 57

B) 68

C) 82

D) 91

