



Grade 7 and 8 Math Circles

April 2nd/3rd/4th
Jeopardy

Introduction

This lesson covers all of the material (except ruler and compass constructions) that we have went through this term. We will be working in groups to complete these problems in a Jeopardy style game.

Questions will vary in difficulty with \$100 questions tending to be the easiest, and \$500 questions tending to be the hardest. Do your best, good luck, and have fun!

Complex Numbers

\$100 i^2

$$-1$$

\$200 $(2 + 2i) + (3 - i)$

$$5 + i$$

\$300 $\overline{(4 - 6i)} - (5 - 2i)$

$$-1 + 8i$$

\$400 $(10 + 7i) \times (6 + 3i)$

$$39 + 72i$$

\$500 $(-7 + 3i) \div (4 + 5i)$

$$-\frac{13}{41} - \frac{47}{41}i$$

Exponents

\$100 8^2 No calculators

$$64$$

\$200 5^{-2} No calculators

$$\frac{1}{25} = 0.04$$

\$300 $\sqrt[3]{-27}$ No calculators

$$-3$$

\$400 $(3^4)^{\frac{1}{2}}$ No calculators

$$9$$

\$500 How much money will be in your account in 5 years if you start with \$10000 and it is compounded daily at 3%?

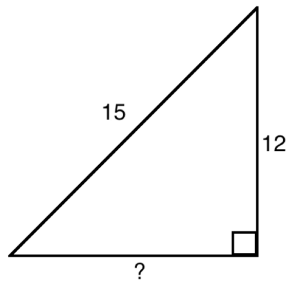
$$\$11618.27$$

Pythagorean Theorem

\$100 What is the Pythagorean Theorem?

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

\$200 What is the length of the missing side?



$$9$$

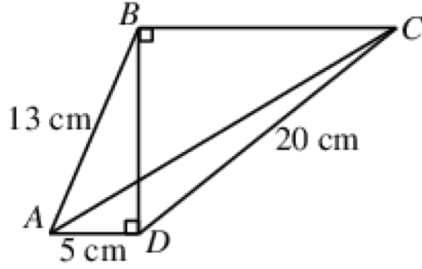
\$300 What is the Manhattan distance between $(-2,3)$ and $(1,-2)$?

$$8$$

\$400 What is the distance between $(4,1,-3)$ and $(-5,6,-1)$? Leave your answer as a square root.

$$\sqrt{110}$$

\$500 In the diagram, $AB = 13\text{cm}$, $DC = 20\text{cm}$, and $AD = 5\text{cm}$. What is the length of AC to the nearest tenth of a centimeter?



24.2 cm

Inequalities

\$100 $3x > 12$

$$x > 4$$

\$200 $3 < 7 - 4x$

$$x < 1$$

\$300 $|3x + 4| < 10$

$$-\frac{14}{3} < x < 2$$

\$400 $-6 < \frac{3x + 6}{2} < 6$

$$-6 < x < 2$$

\$500 $3 < |7 - 4x|$

$$x > \frac{5}{2} \text{ or } x < 1$$

Cryptography

\$100 Decrypt 1005151601180425

A	B	C	D	E	F	G	H	I	J	K	L	M
01	02	03	04	05	06	07	08	09	10	11	12	13
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
14	15	16	17	18	19	20	21	22	23	24	25	26

JEOPARDY

\$200 Which cipher is the correct one to use when decrypting the following?



A

A	B	C
D	E	F
G	H	I

J	K	L
M	N	O
P	Q	R

S	
T	U
V	

W	
X	Y
Z	

B

A	B	C
I	J	K
S	T	U

D	E	F
L	M	N
V	W	X

G	
O	P
Y	

H	
Q	R
Z	

B

\$300 Using a Caesar Cipher with a key number of 4, encrypt Math Circles.

IWPD YENYHAO

\$400 Using a Polybius Square, decrypt the following:

3511421131311531153524351514

PARALLELEPIPED

\$500 Using the keyword MATH and the Word Shift Cipher, encrypt the phrase LAST WEEK.

YBMB JFYS

Gauss

\$100

The value of $1000 + 200 - 10 + 1$ is

- (A) 1191 (B) 1190 (C) 1189 (D) 1209 (E) 1211

(Source: 2015 Gauss (Grade 8), #1)

(A) 1191

\$200

The number represented by \square so that $\frac{1}{2} + \frac{1}{4} = \frac{\square}{12}$ is

- (A) 3 (B) 12 (C) 9 (D) 6 (E) 15

(Source: 2015 Gauss (Grade 8), #10)

(C) 9

\$300

Mateo and Sydney win a contest. As his prize, Mateo receives \$20 every hour for one week. As her prize, Sydney receives \$400 every day for one week. What is the difference in the total amounts of money that they receive over the one week period?

- (A) \$560 (B) \$80 (C) \$1120 (D) \$380 (E) \$784

(Source: 2018 Gauss (Grade 8), #13)

(A) \$560

\$400

Sara goes to a bookstore and wants to buy a book that is originally priced at \$100. Which of the following options gives her the best discounted price?

- (A) A discount of 20%
(B) A discount of 10%, then a discount of 10% off the new price
(C) A discount of 15%, then a discount of 5% off the new price
(D) A discount of 5%, then a discount of 15% off the new price
(E) All four options above give the same price

(Source: 2017 Gauss (Grade 7), #18)

(A) A discount of 20%

\$500

The sum of the first 100 positive integers is 5050. That is, $1 + 2 + \dots + 99 + 100 = 5050$. What is the sum of the first 100 positive *odd* integers?

- (A) 5050 (B) 10 000 (C) 10 050 (D) 10 100 (E) 10 150

(Source: 2014 Gauss (Grade 8), #23)

(B) 10 000