

IMLEM Meet #4
February, 2026

Intermediate Mathematics League of Eastern Massachusetts



Calculator Meet



CLUSTER COORDINATORS - A reminder to all students of some of the rules and of appropriate behavior during this meet: • Many of you are guests in someone else's school – please be respectful of the classrooms and spaces you are using. Any “out of control” behavior in the halls or during a round is not acceptable. If an adult deems your behavior disrespectful or inappropriate, your score may not be counted. • **CALCULATORS:** only *scientific calculators* allowed for meets #4 & #5) • Everyone take a moment to turn off any electronic devices that you want to have with you during the rounds. No electronic devices may be on during the rounds. Use of these devices during the rounds will result in a disqualification.

- **NEW FOR 2025-2026:** The October meet, Category 1, include an extra problem. Questions
- #1, 2, 3, and 4 were worth 2, 2, 1, and 1 points, respectively. The November meet will include
- A fourth question in category 2 as well as in category 1, with point values as just described. Meet #3 in January will include an extra question in categories 1, 2, and 3. Meet #4 will include an extra question in all of the first four categories. Meet #5 will include an extra question in each of the first five categories.
- The success of this innovation will be evaluated in the spring, after all five meets have been completed.

Category 1

Mystery

Meet #4 - February, 2026



Calculator Meet

1) (worth 2 points)

What is the three-digit number where the

- * digits are all even,
- * digits are all different,
- * number is divisible by 4,
- * sum of the digits is 12, and
- * sum of the ones digit and tens digit is equal to the hundreds digit?

2) (worth 2 points)

If Ben were 8 years older, then Ben would be 37 years old in the year 2026.
In what year was Ben born?

3) (worth 1 point)

The value of the digit 8 in the 7-digit number 7,564,823 is 800. The value of the digit 6 is 60,000. By how much is the value of the digit 7 greater than the value of the digit 4 ?

4) (worth 1 point)

How many integers between 10 and 80 have at least three different prime factors?

ANSWERS

- 1) _____
- 2) _____
- 3) _____
- 4) _____



Solutions to Category 1
Mystery
Meet #4 - February, 2026

1) As long as the three digits must be even, different, and have a sum of 12, then those digits must be 2, 4, and 6. The other clues narrow the answer to 624.

2) $2026 - 37 + 8 = 1997$

3) $7,000,000 - 4,000 = 6,996,000$

4) $2 \times 3 \times 5 = 30$, plus also 60

$2 \times 3 \times 7 = 42$

$2 \times 5 \times 7 = 70$

$2 \times 3 \times 11 = 66$

$2 \times 3 \times 13 = 78$

So, there's a total of 6 numbers between 10 and 80 that have at least three different prime factors.

Answers

1) 624

2) 1997

3) 6,996,000

4) 6

Category 2
Geometry
Meet #4 - February, 2026



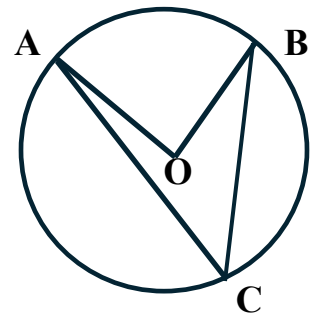
Calculator Meet

1) (worth 2 points)

If the radius of a circle is 48 inches long, then how many inches long is its diameter?

2) (worth 2 points)

In the figure at the right, central angle AOB measures 110 degrees. How many degrees are in the measure of inscribed angle ACB ?

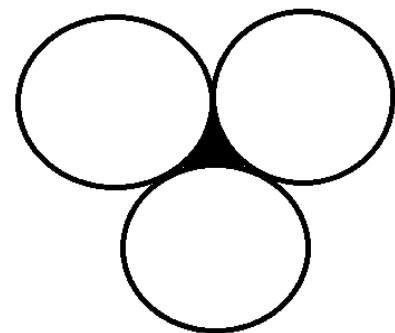


3) (worth 1 point)

A jumbo donut has a 7 cm radius. A cross-section has a hole that is 8 cm in diameter. How many square centimeters are in the edible “doughy” portion of the donut? Use $\pi \approx 3.14$. Round your answer to the nearest whole number.



4) Three congruent circles, each with a radius of 20 inches, are mutually tangent with any two circles intersecting at a single point, as shown below. How many square inches are in the shaded area? Use $\pi \approx 3.142$. Round your answer to the nearest whole number.



ANSWERS

1) _____ inches

2) _____ degrees

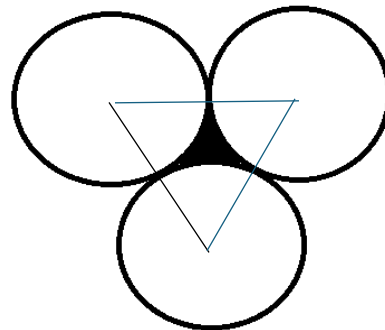
3) _____ sq. cm

4) _____ sq. in.

Solutions to Category 2
Geometry
Meet #4 - February, 2026

Answers

- 1) The diameter is twice the radius. $(2)(48) = 96$ inches.
- 2) An inscribed angle of a circle has half the measurement of a central angle that intercepts the same arc.
 $(1/2)(110) = 55$ degrees.
- 3) Subtract the areas of the cross-sections of the two circles:
 $(3.14)(7)(7) - (3.14)(4)(4)$
 $= 153.86 - 50.24$
 $= 103.62$ square centimeters
 $= 104$ when rounded to the nearest whole number.
- 4) The area of the shaded portion is equal to the difference between the area of the equilateral triangle formed by connecting the centers of the three circles, and the sum of three congruent $1/6$ circles that, combined, make a semi-circle.
- $$\begin{aligned} & (1/2)(\text{base})(\text{height}) - (1/2)(\pi)(\text{radius squared}) \\ &= (1/2)(40)(S/2)(\text{square root of } 3) - (1/2)(3.142)(20)(20) \\ &= (20)(40/2)(1.732 \dots) - (200)(3.142) \\ &= (400)(1.732 \dots) - 628.4 \\ &= 692.82 \dots - 628.4 \\ &= 64.42 \dots \\ &= 64 \text{ square inches, when rounded to the nearest whole number.} \end{aligned}$$



Category 3
Number Theory
Meet #4 - February, 2026



Calculator Meet

1) (worth 2 points)

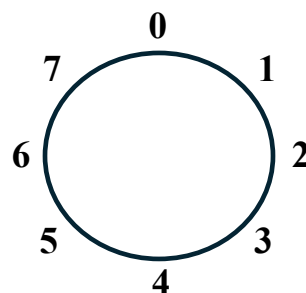
How many numbers in the infinite arithmetic sequence below are there between 70 and 90 ?

4 8 12 16 20 24 . . .

2) (worth 2 points)

A Twilight Zone Marathon began at 4 o'clock on this mod 8 clock. The marathon lasted for 173 hours. At what time did the marathon end?

Your answer will be a whole number.



3) An oak tree dropped 3 acorns on day 1, 6 acorns on day 2, 12 on day 3, and so on, according to the geometric sequence below. What is the sum of the number of acorns that dropped on days 5, 6, and 8?

3 6 12 24 48 . . .
day 1 day 2 day 3 day 4 day 5

4) What is the sum of all whole numbers from 27 through 418 ? In other words, what is the value of $27 + 28 + 29 + \dots + 416 + 417 + 418$?

ANSWERS

1) _____

2) _____

3) _____

4) _____

Solutions to Category 3
Number Theory
Meet #4 - February, 2026

- 1) The sequence consists of consecutive multiples of 4. Those between 70 and 90 are 72, 76, 80, 84, and 88 for a total of five.
- 2) Divide 173 by 8 = 21 with remainder of 5.
Now add the remainder of 5 to the starting time of 4 to arrive at 9, which is 1 in mod 8.
- 3) Continuing the sequence:
3, 6, 12, 24, 48, 96, 192, 384
The sum of terms #5, 6, and 8 is $48 + 96 + 384 = 528$.
- 4) Subtract the sum of the whole numbers from 1 through 26 from the sum of the whole numbers from 1 through 418.
 $(1 + 418)(418 / 2) - (1 + 26)(26 / 2)$
 $= (419)(209) - (27)(13)$
 $= 87,571 - 351$
 $= 87,220$.

Answers

- 1) 5
2) 1
3) 528
4) 87,220

Category 4
Arithmetic
Meet #4 - February, 2026



Calculator Meet

1) (worth 2 points)

Henry bought a used car for \$ 6,350. He then had to pay a 6% sales tax when he registered the car at the RMV. How many dollars did Henry pay in all, including the tax?

2) (worth 2 points)

Carol has 60 boxes of candy. If Carol sells 15% of the boxes, then how many boxes will be left unsold?

3) (worth 1 point)

An item was reduced in price by 20% by mistake. The new reduced price was then increased by X% in order to restore the original price. What is the value of X ?

4) The equation to the right calculates the value A, that is the result of investing an initial amount of money, M, at an annual (yearly) rate of R for T years when the interest is compounded W

$$A = M \left(1 + \frac{R}{W} \right)^{WT}$$

times annually. Stan wanted to invest \$30,000 at his bank at an annual rate of 4.6%, compounded annually (yearly), for 15 years. Ollie insisted on earning more interest at his bank at an annual rate of 4%, compounded five times monthly, for 15 years. How much more interest was earned with the more profitable deal? Round your answer to the nearest hundred dollars.

Answers

- 1) _____
2) _____
3) _____
4) _____



Solutions to Category 4
Arithmetic
Meet #4 - February, 2025

Answers

1) Multiply 6,350 by 106%
 $= (6,350)(1.06) = \$6,731.$

2) Multiply 60 by 85%
 $= (60)(0.85) = 51$

3) $X - (20\% \text{ of } X) = 80\% \text{ of } X$
 $N(0.8 X) = X$
 $N = X / (0.8 X) = 1.25$

So, the reduced price must be increased by 25% in order to restore the original price.

4) $A = M \left(1 + \frac{R}{W} \right)^{WT}$
 $= 30,000 \left(1 + \frac{0.04}{60} \right)^{(60)(15)}$
 $= 30,000 (1 + 0.000666667)^{900}$
 $= 30,000 (1.000666667)^{900}$
 $= 30,000 (1.821754575)$
 $= 54,652.64$ This is how much money Ollie would have after 15 years.

Now for Stan:

$$A = M(1 + R)^T$$

$$= 30,000(1 + 0.046)^{15}$$

$$= 30,000(1.046)^{15}$$

$$= 30,000(1.963248)$$

$$= 58,897.44$$
 This is how much money Stan would have after 15 years.

The difference would be $58,897.44 - 54,652.64$, or $\$4244.80$, with Stan having earned more. Rounding the final answer to the nearest hundred yields $\$4200$. Even if students had not rounded early and had left calculations in calculator memory, the final answer would still be $\$4200$.

1) 6,731

2) 51

3) 25

4) 4200

Category 5

Algebra

Meet #4 - February, 2026



Calculator Meet

1) (worth 2 points)

Hayden paid the lunch bill with only quarters, dimes, and pennies. There were five fewer quarters than dimes and four more pennies than quarters. The bill was \$ 7.38. How many dimes were used?

2) (worth 2 points)

A test has 42 questions, some worth two points and the rest worth three points. A perfect score is 100 points. How many three-point questions are on the test?

3) (worth 2 points)

Seven track suits and four pairs of running shoes cost a total of \$ 587.53. Four track suits and seven pairs of running shoes cost a total of \$ 645.46. How much money would it cost the Arlington Ottoson track team to supply all of its 37 runners with one track suit and one pair of running shoes apiece? Your answer will be a decimal number of dollars.

ANSWERS

1) _____

2) _____

3) _____



Solutions to Category 5

Algebra

Meet #4 - February, 2026

Answers

1) 24

2) 16

3) 4,147.33

1) Let Q = the number of quarters

$Q + 5$ = the number of dimes

$Q + 4$ = the number of pennies

The sum of the values of all the coins = \$7.38

$$0.25Q + 0.10(Q + 5) + 0.01(Q + 4) = 7.38$$

Multiply both sides by 100 to eliminate the decimal look of the equation.

$$25Q + 10Q + 50 + (Q + 4) = 738$$

$$36Q + 54 = 738$$

$$36Q = 684$$

$$Q = 19$$

$$Q + 5 = 24$$

Therefore, there are 24 dimes.

2) Let X = the number of 2-point questions

Y = the number of 3-point questions

$$X + Y = 42 \quad \text{so } Y = 42 - X$$

$$2X + 3Y = 100$$

Substitute $42 - X$ for Y in the second equation.

$$2X + 3(42 - X) = 100$$

$$2X + 126 - 3X = 100$$

$$126 - X = 100$$

$$X = 26$$

$$Y = 16$$

So, there are 16 three-point questions on the test.

3) Let T = the cost of one track suit

R = the cost of one pair of running shoes

$$7T + 4R = 587.53$$

$$4T + 7R = 645.46$$

$$4(7T + 4R = 587.53)$$

$$7(4T + 7R = 645.46)$$

$$28T + 16R = 2,350.12$$

$$28T + 49R = 4,518.22$$

$$33R = 2,168.10$$

$$R = 65.70$$

$$T = 46.39$$

$$37(65.70 + 46.39) = 4,147.33$$

So, it costs \$4,147.33 to outfit the team.

Category 6
Team Round
Meet #4 - February, 2026

Each of the following nine problems is worth four points.

- 1) Archie took a long trip with an average rate of speed of 60 miles per hour. On the return trip, following the same route, Archie averaged 40 miles per hour. What was the average rate of speed, in miles per hour, for the entire round trip?
- 2) What is the units digit (ones place) of the product of the first 24 prime numbers?
- 3) Derek completed a job in 3 hours and 20 minutes, earning \$ 150.00. How many dollars was Derek's earning rate per hour?
- 4) How many integers make the inequality $(X + 3)(X - 7) < 0$ true?
- 5) What is the sum of the digits of the smallest 3-digit positive integer whose square is a 6-digit number?

ANSWERS

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

7) _____

8) _____

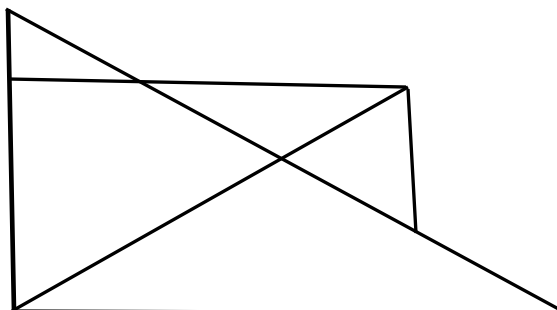
9) _____

- 6) The sum of four consecutive odd integers is 328.
What is the value of the largest of the four integers?

- 7) The product of two consecutive positive even integers is 7,224. What is the sum of those two even integers?

- 8) Evaluate $2AB^2C^3 + 70B^3C + 2B^4 - 54$
if $A = 3$, $B = -4$, and $C = 7$.

- 9) How many triangles are in the shape below?



Solutions to Category 6
Team Round
Meet #4 - February, 2026

1) Average speed = (total distance) / (total time).

For example, if the one-way length of the trip was 240 miles, then the total distance would be 480 miles and the total time would be $(240 / 60) + (240 / 40)$ hours, or $4 + 6$, or 10 hours. The average rate of speed would be $480 / 10$, or 48 miles per hour.

2) Included in the first 24 prime numbers are 2 and 5 whose product is 10. Multiplying 10 by the remaining 22 prime numbers would yield a units digit of 0.

3) $\$ 150 / (3 \text{ hours } 20 \text{ minutes})$
 $= 150 / (3 \frac{1}{3}) = 150 / (10/3) = 150 (3/10)$
 $= 450/10 = \$ 45 \text{ per hour.}$

4) For the product to be negative (less than zero), only one of the two factors can be negative. The following positive integers satisfy this condition: - 2, - 1, 0, 1, 2, 3, 4, 5, and 6 for a total of 9 integers.

5) Using number sense, begin with finding the square root of the smallest 6-digit positive integer, 100,000 which is about 316.227 . . .

This, squaring 316 yields a number too small (99,856). Squaring the next consecutive integer, 317, yields the correct number (100,489).

The sum of the digits of 317 is $3 + 1 + 7 = 11$.

6) $X + (X + 2) + (X + 4) + (X + 6) = 328$

$$4X + 12 = 328$$

$$4X = 316$$

$$X = 79$$

So, $X + 6$, the largest of the four integers, is $79 + 6 = 85$.

7) The square root of 7,224 is about 84.994. So, the two consecutive even integers, 84 and 86, have a product of 7,224. The sum of $84 + 86$ is 170.

ANSWERS

1) 48

2) 0

3) 45

4) 9

5) 11

6) 85

7) 170

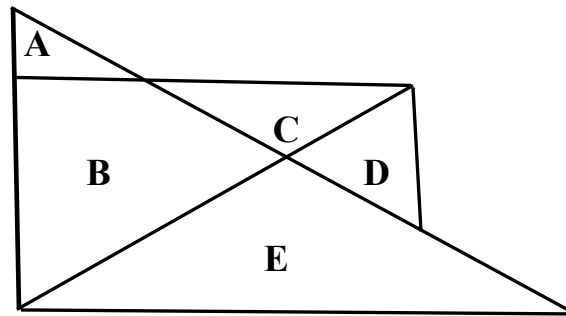
8) 2,026

9) 8

THE SOLUTIONS TO #8 AND #9 ARE ON THE NEXT PAGE.

$$\begin{aligned}
 8) \quad & 2(3)(-4)^2(7^3) + 70(-4)^3(7) + 2(-4)^4 - 54 \\
 &= (6)(16)(343) + (70)(-64)(7) + (2)(256) - 54 \\
 &= 32,928 - 31,360 + 512 - 54 \\
 &= 2,026
 \end{aligned}$$

9)



The following lettered spaces or sums of lettered spaces make triangles:

A, C, D, E, C+D, B+C, A+B, A+B+E

That is a total of 8 triangles.