



University of Waterloo
Faculty of Mathematics



Centre for Education in
Mathematics and Computing

Grade 6 Math Circles

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Gauss Contest Preparation

[Gauss7 2009 Q6]

The temperature in Vancouver is 22°C . The temperature in Calgary is 19°C colder than the temperature in Vancouver. The temperature in Quebec City is 11°C colder than the temperature in Calgary. What is the temperature in Quebec City?

- (A) 14°C (B) 3°C (C) -8°C (D) 8°C (E) -13°C

$$22 - 19 = 3$$

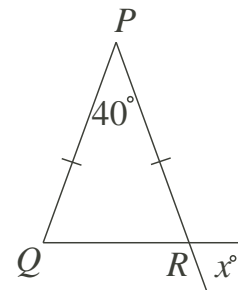
$$3 - 11 = -8 \quad \therefore \text{The answer is C}$$

[Gauss7 2008 Q13]

In the diagram, $\triangle PQR$ is isosceles. The value of x is

- (A) 40 (B) 70 (C) 60 (D) 30 (E) 110

Since this triangle is isosceles, the two missing interior angles are equal. Because the interior angle is also an opposite angle to x , we know that the interior has the value of x . The sum of the interior angles of a triangle is 180° .



$$180 = 40 + x + x$$

$$140 = 2x$$

$$x = 70 \therefore \text{the answer is B}$$

[Gauss7 2007 Q17]

To rent a kayak and a paddle, there is a fixed fee to use the paddle, plus a charge of \$5 per hour to use the kayak. For a three hour rental, the total cost is \$30. What is the total cost for a six hour rental?

- (A) \$50 (B) \$15 (C) \$45 (D) \$60 (E) \$90

For six hours, we need to pay for three hours more than the three hour rental.

$$30 + (3 \times 5) = 45 \therefore \text{The answer is C}$$

[Gauss7 2006 Q23]

In the addition of two 2-digit numbers, each blank space, including those in the answer, is to be filled with one of the digits 0, 1, 2, 3, 4, 5, 6, each used exactly once. The units digit of the sum is

- (A) 2 (B) 3 (C) 4 (D) 5 (E) 6

$$\begin{array}{r} \boxed{A} \boxed{B} \\ + \boxed{C} \boxed{D} \\ \hline \boxed{E} \boxed{F} \boxed{?} \end{array}$$

To get a 3-digit number, A and C could be 5 and 6, or 4 and 6. If the pair is 5 and 6, then B and D won't add to more than 7, so E and F are both 1, which breaks the rule. Therefore, A and C must be 4 and 6. B and D won't add up to more than 8, so E is 1 and F is 0. This leaves us with 2, 3, and 5, where one of these numbers is the sum of the other two. It is clear that $2 + 3 = 5$. \therefore the answer is D

[Gauss7 2005 Q23] Using an equal-armed balance, if $\square\square\square\square$ balances $\circ\circ$ and $\circ\circ\circ$ balances $\triangle\triangle$, which of the following would not balance $\triangle\circ\square$?

- (A) $\triangle\circ\square$ (B) $\square\square\square\triangle$ (C) $\square\square\circ\circ$ (D) $\triangle\triangle\square$ (E) $\circ\square\square\square\square$

Let s be the weight of a square, c be the weight of a circle, and t be the weight of a triangle. From the first clue, we have $4s = 2c$, which we can reduce to $2s = c$ or equivalently. From the second clue, we have $3c = 2t$ or equivalently $t = \frac{3}{2}c = \frac{3}{2}(2s) = 3s$. Now we can represent all the groups in terms of the weight square.

Original: $\triangle\circ\square \rightarrow 3s + 2s + s = 6s$

A: $\triangle\circ\square \rightarrow 3s + 2s + s = 6s$

B: $\square\square\square\triangle \rightarrow s + s + s + 3s = 6s$

C: $\square\square\circ\circ \rightarrow s + s + 2s + 2s = 6s$

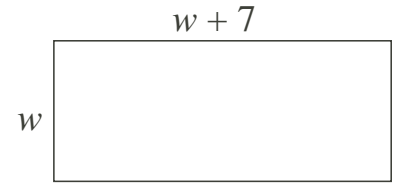
D: $\triangle\triangle\square \rightarrow 3s + 3s + s = 7s$

E: $\circ\square\square\square \rightarrow 2s + s + s + s = 6s$

\therefore the answer is D

The length of a large rectangular room is 7 metres more than its width.
If the perimeter is 34 metre, then length of the room, in metres is

- (A) 5 (B) 13.5 (C) 19 (D) 12 (E) 6.75



The perimeter is twice the length plus twice the width.

$$\begin{aligned} 34 &= 2w + 2(w + 7) \\ 34 &= 2w + 2w + 14 \\ 34 &= 4w + 14 \\ 20 &= 4w \\ w &= 5 \implies w + 7 = 12 \end{aligned}$$

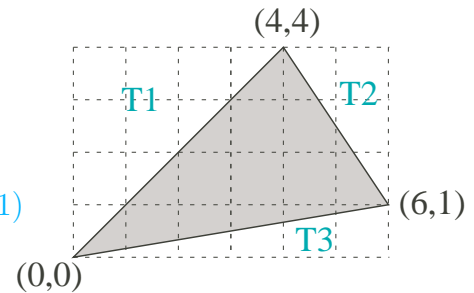
\therefore the answer is D

The area of the shaded triangle, in squared units is

- (A) 12 (B) 24 (C) 9 (D) 10 (E) 7

The area of the rectangle minus the areas of the three “outer” triangles will give use the area of the shaded triangle.

$$\begin{aligned} A_{rect.} - A_{T1} - A_{T2} - A_{T3} &= (6)(4) - \frac{1}{2}(4)(4) - \frac{1}{2}(2)(3) - \frac{1}{2}(6)(1) \\ &= 24 - 8 - 3 - 3 \\ &= 10 \end{aligned}$$



\therefore the answer is D

Wanna Pizza makes square slices of pizza. Their single slices are 10cm by 10cm. Two single slices can feed a person. How many people can their Mega Party Pizza feed if the pizza’s dimension is 1m by 1m?

- (A) 100 (B) 500 (C) 50 (D) 200 (E) 1000

A single slice is 10cm long, and a whole pizza is 100cm long, so the whole pizza is 10 slices by 10 slices. $10 \times 10 = 100$; there are 100 slices of pizza, 2 slices feed one person, so the pizza can feed 50 people.

\therefore the answer is C

PUBLICATIONS

Please see our website <http://cemc.uwaterloo.ca> for information on publications which are excellent resources for enrichment, problem solving and contest preparation.

For more past contests and solutions, please visit http://www.cemc.uwaterloo.ca/contests/past_contests.html