MOEMS Practice Problems · Division E and M

Part 1 · Division E problems

HOW TO USE MOEMS runs five contests a year, November to March. Each one is five problems in 30 minutes: one point for a correct answer and nothing taken away for a wrong one, so never leave a question blank.

A Division E practice set

Grades 4–6 · five problems · 30 minutes

1. Nora spent half her birthday money on a book. Then she spent $4 on stickers. She has $6 left. How much birthday money did she start with?

Answer

2. On Monday, Malik read 1/4 of a 200-page book. On Tuesday he read 1/5 of what was left. How many pages has he read in total?

Answer

3. Lockers in a hallway are numbered 1 to 50. A red sticker goes on every 3rd locker, a blue sticker on every 4th locker. How many lockers get both stickers?

Answer

4. Priya has $45. She buys 3 notebooks at $6 each and 2 pens at $2.50 each. How much does she have left?

Answer

5. A rectangular garden is 3 times as long as it is wide, and its perimeter is 64 feet. What is its area?

Answer

Tip Read each problem twice before you start. The second read is where the plan comes from.

Part 2 · Division M problems

B Division M practice set

Grades 6–8 · five problems · 30 minutes

1. At a school fair, the ratio of blue tickets sold to green tickets sold was 3:5. After 24 more green tickets were sold, the ratio became 3:8. How many blue tickets were sold?

Answer

2. What is the smallest positive integer that leaves a remainder of 4 when divided by 5, a remainder of 3 when divided by 4, and a remainder of 2 when divided by 3?

Answer

3. Three consecutive even integers add up to 96. What is the product of the smallest and the largest?

Answer

4. Pipe A fills a tank in 12 minutes. Pipe B fills the same tank in 18 minutes. Working together, how many minutes will it take to fill the tank?

Answer

5. A square and an equilateral triangle have the same perimeter. The triangle's side is 8 cm longer than the square's side. What is the area of the square?

Answer

Tip Set up the relationship before you solve. Most of these open up once the equation is written down.

Part 3 · Division E solutions

C Division E solutions

Grades 4–6

1. Nora spent half her birthday money on a book. Then she spent $4 on stickers. She has $6 left. How much birthday money did she start with?

Work backwards. Before the stickers she had $6 + $4 = $10, and that $10 was half of her money. So she started with $20.

Answer: $20

2. On Monday, Malik read 1/4 of a 200-page book. On Tuesday he read 1/5 of what was left. How many pages has he read in total?

Monday: 200 × 1/4 = 50 pages, leaving 150. Tuesday: 150 × 1/5 = 30 pages. Total read: 50 + 30 = 80 pages.

Answer: 80 pages

3. Lockers in a hallway are numbered 1 to 50. A red sticker goes on every 3rd locker, a blue sticker on every 4th locker. How many lockers get both stickers?

A locker gets both only if its number divides evenly by 3 and by 4, which means it is a multiple of 12. Between 1 and 50 that is 12, 24, 36 and 48.

Answer: 4 lockers

4. Priya has $45. She buys 3 notebooks at $6 each and 2 pens at $2.50 each. How much does she have left?

Notebooks cost 3 × $6 = $18. Pens cost 2 × $2.50 = $5. Together that is $23 spent, so $45 - $23 = $22 left.

Answer: $22

5. A rectangular garden is 3 times as long as it is wide, and its perimeter is 64 feet. What is its area?

The perimeter is 2 widths plus 2 lengths, and since the length is 3 widths, that is 8 widths in total. 8 widths = 64 feet, so 1 width = 8 feet and the length is 24 feet. Area: 8 × 24 = 192 square feet.

Answer: 192 square feet

Tip If a strategy did not click, that is information, not a failure. Redo it from scratch next session.

Part 4 · Division M solutions

D Division M solutions

Grades 6–8

1. At a school fair, the ratio of blue tickets sold to green tickets sold was 3:5. After 24 more green tickets were sold, the ratio became 3:8. How many blue tickets were sold?

Only the green count changed, so let blue = 3x and green = 5x. After the increase, 3x : (5x + 24) = 3 : 8, which gives 24x = 15x + 72, so x = 8. Blue tickets: 3 × 8 = 24.

Answer: 24 blue tickets

2. What is the smallest positive integer that leaves a remainder of 4 when divided by 5, a remainder of 3 when divided by 4, and a remainder of 2 when divided by 3?

Each remainder is exactly 1 less than its divisor, so the number is 1 less than a common multiple of 3, 4 and 5. Their smallest common multiple is 60, so the answer is 60 - 1 = 59.

Answer: 59

3. Three consecutive even integers add up to 96. What is the product of the smallest and the largest?

Call the integers n - 2, n and n + 2. Their sum is 3n = 96, so n = 32. The integers are 30, 32 and 34. Smallest times largest: 30 × 34 = 1,020.

Answer: 1,020

4. Pipe A fills a tank in 12 minutes. Pipe B fills the same tank in 18 minutes. Working together, how many minutes will it take to fill the tank?

In one minute, Pipe A fills 1/12 of the tank and Pipe B fills 1/18. Together that is 3/36 + 2/36 = 5/36 of the tank per minute. Filling the whole tank takes 36 ÷ 5 = 7 1/5 minutes.

Answer: 7 1/5 minutes

5. A square and an equilateral triangle have the same perimeter. The triangle's side is 8 cm longer than the square's side. What is the area of the square?

Let the square's side be s. The square's perimeter is 4s and the triangle's is 3(s + 8). Setting them equal: 4s = 3s + 24, so s = 24. Area: 24 × 24 = 576 square centimetres.

Answer: 576 sq cm

Tip Check each answer against the wording. A correct method can still answer the wrong question.

Answer Key · MOEMS Practice Problems

For parents and teachers. Keep this page back until the thirty minutes are up.

Division E · grades 4–6

1. $20
2. 80 pages
3. 4 lockers
4. $22
5. 192 square feet

Division M · grades 6–8

1. 24 blue tickets
2. 59
3. 1,020
4. 7 1/5 minutes
5. 576 sq cm

How to run these as a timed set

A MOEMS contest is five problems in 30 minutes. One point for a correct answer, nothing deducted for a wrong one, so a guess never costs anything. Print pages 1 and 2, set a 30-minute timer for one division, and keep the solutions back until time is up. Mark it together, then spend the next session only on the misses, redoing them from scratch rather than rereading the solution.

About these problems

All ten problems are original, written by Gonit in the MOEMS style. None is reproduced or reworded from a past MOEMS contest — those are the organisation's copyrighted material, sold as the Contest Problems volumes through its own store. MOEMS also publishes free sample tournament questions and a Problem of the Week on moems.org.

What MOEMS publishes free

Sample tournament questions
Official specimen problems for both divisions, showing the real question style. No solutions given.

Problem of the Week
One problem published weekly on moems.org, open to anyone with no account.

The contest itself
Supplied to the school by the PICO. A parent never pays for it directly.

The Contest Problems volumes are a paid product and no free PDF of them exists legitimately.

Tip Save one unseen set for the week before a contest as a final dry run.