50

MATH

REASONING QUESTIONS

VOLUME 1

E. A. MORA

If you find typographical errors, format, syntax errors, logic errors, accuracy, and/or other errors of any kind, please contact the author.

Corrections and improvements are welcome.

This version was prepared by E. A. Mora.

Website: https://linktr.ee/eamora.

Email: eamora.freelancer@gmail.com.

DEDICATION

To my parents.

Thanks for all your hard work and
for always being there for me.

CONTENTS

PREFACE

Since high school, I have dedicated special attention to math reasoning problems.

I always found them very appealing, entertaining, challenging, and engaging.

During my studies, I collected more than 5000 of these problems, from all levels.

This short book is a compilation of 50 of those problems.

You only need to know basic arithmetic and algebra and have a pencil and paper to solve these problems.

The problems are not ordered according to their difficulty.

I got the problems presented in this book from a professor or a classmate.

These problems were rewritten many times during the different courses where they were applied.

Names, values, and many other things are different from the original problems.

If for any reason, you or someone you know claims that any of the problems presented here are related to them by copyrights, just send me a message.

QUESTIONS

QUESTION 1

Monica has 27 capybaras in a shelter.

This year, all but 13 capybaras have had babies.

None of them has had more than two baby capybaras.

23 baby capybaras have been born in total.

How many of the baby capybaras have had one baby only?

A. 3
B. 5
C. 6
D. 1

QUESTION 2

A factory has 3 assembly lines.

The number of items in line 2 equals the sum of items in line 1 and line 3.

At a certain time of the day, 5 items are sent from line 3 to line 2 and 7 items are sent from line 2 to line 1.

Also, 6 items from line 1 leave the factory.

How many more items are now in line 2 than in line 1 and line 3 combined?

A. 6 more items
B. 3 more items
C. 2 more items
D. 1 more item

QUESTION 3

Four Olympic athletes, Nadia, Mary, Jessica, and Naomi, have surnames Allen, Armstrong, Barnes, and Campbell - but not necessarily in that order.

i. Jessica can swim faster than Allen but can't run as fast as Barnes.
ii. Allen is a faster runner than Naomi but can't swim as fast as Armstrong.
iii. Nadia is faster than both Jessica and Campbell but can't run as fast as Allen.

Based on that information, what is the surname of each athlete?

A. Nadia is Armstrong, Mary is Campbell, Jessica is Barnes, and Naomi is Allen.
B. Nadia is Barnes, Mary is Allen, Jessica is Armstrong, and Naomi is Campbell.
C. Nadia is Campbell, Mary is Allen, Jessica is Armstrong, and Naomi is Barnes.
D. Nadia is Allen, Mary is Barnes, Jessica is Campbell, and Naomi is Armstrong.

QUESTION 4

In a basketball tournament, the blue team and the red team are disputing the championship.

The blue team scored one-sixth of its points in the 1^{st} quarter, one-third of its points in the 2^{nd} quarter, one-fourth of its points in the 3^{rd} quarter, and the remaining points in the 4^{th} quarter.

The blue team won by 2 points.

The combined score of the two teams playing was 190 points.

How many points did the blue team score in the 4^{th} quarter?

A. 24 points
B. 22 points
C. 23 points
D. 21 points

QUESTION 5

An online computer store is selling hard drives of certain colors at discount.

An online order from three customers is received and Robert, the head of the packaging department, starts to process it.

At a certain point, Robert realized he put the wrong address labels on each of the parcels.

Josef ordered two graphite hard drives, Nick ordered two silver hard drives, and Teresa ordered one graphite and one silver hard drive.

Each pair of hard drives has been packed separately in identical boxes before being wrapped up into the customers' parcels.

How many pairs of hard drives will Robert have to inspect before he can correctly relabel the parcels?

A. 3
B. 0
C. 1
D. 2

SOLUTIONS

SOLUTION TO QUESTION 1

Since 13 of the capybaras did not have babies, the remaining $27 - 13 = 14$ capybaras had at least one baby.

If they had had exactly one baby each, there would have been 14 baby capybaras in total.

Thus, the remaining $23 - 14 = 9$ babies must have come from capybaras having two babies each, since none of the capybaras had more than two babies.

Therefore, 9 capybaras had two babies, and $14 - 9 = 5$ capybaras had one baby.

The correct choice is option B.

SOLUTION TO QUESTION 2

When 5 items go from line 3 to line 2 there will be 10 more items in line 2 than in lines 1 and 3 combined (line 3 sends 5 items, line 2 receives 5 items).

When 7 items go from line 2 to line 1, there will be 4 more items in lines 1 and 3 combined than in line 2.

After the 6 items get out of the factory, there will be 2 more items in line 2 than in line 1 and line 3 combined.

The correct choice is option C.

SOLUTION TO QUESTION 3

From (iii), we know Nadia can't be Campbell or Allen.

We also know from (i) that Jessica can't be Allen or Barnes, and from (iii) that he cannot be Campbell.

That means he must be Armstrong and Nadia must be Barnes.

From (ii), Allen is a faster runner than Naomi, which means Mary must be Allen, leaving Naomi to be Campbell.

The correct choice is option B.

SOLUTION TO QUESTION 4

With a combined score of 190 points and the blue team winning by 2 points, the score of the game was

$$\frac{190}{2} = 95 + 1 = 96;$$
$$95 - 1 = 94;$$

96 to 94.

In the first quarter, the blue team scored $1/6$ of 96 which is 16 points.

In the second quarter $1/3$ of 96 which is 32 points.

In the third quarter $1/4$ of 96 which is 24 points.

Therefore, the blue team scored the remaining

$$96 - (16 + 32 + 24) = 24 \text{ points}$$

in the fourth quarter.

The right choice is option A.

SOLUTION TO QUESTION 5

Robert must look for the parcel wrongly addressed to Teresa and open it.

If he sees a graphite pair of hard drives then he knows that this parcel must be the one for Josef.

It follows that, as every parcel was wrongly addressed, the one addressed to Josef should go to Nick, and the one addressed to Nick should go to Teresa.

The same analysis follows if the pair of hard drives were found to be silver.

Hence, Robert will only need to have a look at one pair of hard drives to be able to decide how to readdress the packages.

The correct choice is option C.

ABOUT THE AUTHOR

I have a bachelor's degree in mathematics.

I completed my university degree in 2014.

Since then, I work as a freelance math content writer, LaTeX typesetter, illustrator, and editorial designer.