WEEKEND PROBLEMS

A

What is the smallest whole number that when written in words has its letters in alphabetical order?

B

OCT 31 = DEC 25 Why?

C

Why does a mirror reverse left and right but not up and down?

D

Find three whole numbers in arithmetic progression whose product is prime.

E

The sequence
2, 3, 6, 1, 8, 6, 8, 4, 8, 4, 8, 3, 2, 3, 2, 3, 2, 3, 2, 2, 4, 6, 6, . .
was produced as follows:
Start with 2, 3
2 x 3 = 6, so add 6 to the sequence.
Now you've got 2, 3, 6
3 x 6 = 18, so add 1 and 8 to the sequence.
Now you've got 2, 3, 6, 1, 8
6 x 1 = 6 and so on . . .

Which digits appear in the sequence?
What happens if you start with different numbers?

F

A demographer once said that a population growing at the rate of r% per year takes 70 ÷ r years to double. Is this true?

G

Why doesn't a three-legged stool wobble, even on the most uneven surface?

H

What is the value of 0^0 ?

I

Find a formula that will generate only primes.

W

The State of Inertia, in a last-ditch effort to revive an ailing economy, has decided to go ahead with the controversial change to a duodecimal based arithmetic, introducing two new digits:

POW (written ▮)
WHAM (written ▮).

In a massive referendum on the relative merits of the two new symbols, the country came down in favour of POW carrying more weight than WHAM. Consequently POW is interposed in a higher position than WHAM amongst the ten old digits, which keep their usual order.

Teething troubles with the new base twelve calculators necessitated some sort of check on their working, so each calculator bears the answers to two calculations: 35 x 64 and 54 x 66. One of these answers consists solely of the new digits, the other answer contains neither of them. What are the two answers?

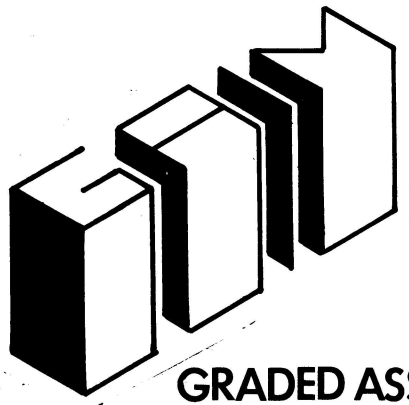
X

Weather records show that in the State of Inertia, every rainy day is followed by a dry day, while half the dry days are followed by rainy days. What is the weather like 'on average'?

Y

At a dance everyone stands in a triangular array. After one of them leaves they stand in a square array. How many were at the dance?

Space for working:



GRADED ASSESSMENT IN MATHEMATICS

J

The State of Inertia is divided in two by a vast plain, and apart from a single, straight railway track, this plain is completely featureless. You, predictably, are the only survivor of a tragic aircraft crash and you find yourself alone, with no food,water etc. etc.....

It is the middle of a moonless night and you hear the whistle of a train. It is the monthly Trans-Inertial Express! You can identify the direction from which the whistle came, but not the direction in which the train was heading.

What should you do to maximise your (very slim) chances of survival.

K

Three slices of bread are to be toasted under a grill. The grill can hold two slices at a time, but only toasts one side at a time. It takes 30 seconds to toast one side, 5 seconds to put in or take out a slice of bread, and 3 seconds to turn a slice over. What is the shortest time in which the three slices can be toasted?

L

Rose collects beetles, lizards and worms. She has more worms than beetles and lizards added together. Altogether in the collection there are 12 heads and 26 legs. How many lizards?

M

The other day I had more than 50p in change, but I could not change 50p. What are the possibilities?

N

Find a formula that will generate all primes.

O

Can every network drawn without crossings be drawn with straight lines?

P

Is the number of people who have shaken hands an odd number of times odd or even?

Q

In a college there are 200 staff: 103 in the Science faculty, 63 in the Arts faculty and 34 in the Education faculty. The governing body consists of 20 staff, the number from each faculty being in proportion to its staff members. How should the staff be allocated? What happens if the size of the governing body is increased to 21?

R

A certain village in Jacobean times had all the valuables locked in a chest in the church. The chest had a number of locks on it each with its own distinct key. The aim of this elaborate (and costly!) procedure was to ensure that any three people in the village would be able between them to open up the chest, but no two people would be able to. How was this done?

S

17 4 67 5 24 31 46 19

Split this set of numbers into two sets of numbers so that the totals of the numbers in the two sets are as close as possible.

T

For each numbered statement, decide whether it is true or false.

1) Statement 2 is true
2) Statement 1 is false
3) Statement 3 is false
4) There are two mistakes in statement 4
5) is a sentence when repeated

U

What is the size of the smallest rectangle that can be used to wrap an l x m x n box?

V

Where do you often see the fraction $24/31$?