SYDNEY TECHNICAL HIGH SCHOOL

(Established 1911)

YEAR 10 – Term 4 Assessment Task

2010

Mathematics

General Instructions

- Working time - 70 minutes
- Write using black or blue pen
- Board-approved calculators may be used
- All necessary working should be shown in every question
- Diagrams are not drawn to scale
- Where questions are multiple choice circle the letter corresponding to the correct answer

Total marks - 55

- Attempt Questions 1 – 5
- All questions are of equal value

Name :_____

Teacher :_____

Question 1	Question 2	Question 3	Question 4	Question 5	**Total**

Question 1

(a) Solve $(2x - 1)(x + 4) = 0$

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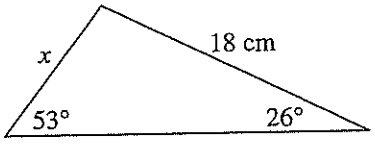
(b) The ratio of boys to girls in a class is 3: 2. Today there are 12 boys in the class. Tomorrow 2 new boys will be enrolled in the class. What will the ratio of boys to girls be then ?

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(c) Find x, giving your answer in centimetres correct to 1 decimal place.



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(d) A motor car travels 6.25 kilometres on 1 litre of fuel. How many litres per 100 kilometres is this ?

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(e) Find the distance between the points $(-4, 8)$ and $(1, 4)$ (exact form)

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(f) Draw a neat sketch of the curve $x^2 + y^2 = 9$

(g) Solve $\frac{2}{15} = \frac{1}{8} + \frac{1}{x}$

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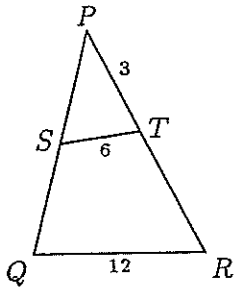
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(h) In ΔPQR, $\angle PST = \angle PRQ$ and lengths of line segments are as shown.

Find the length of PQ.



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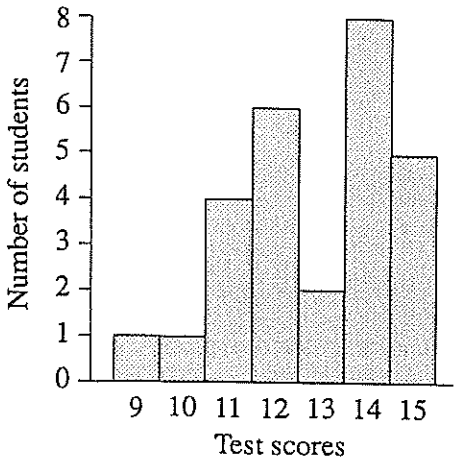
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(i) The results of a Year 10 class test are shown in the frequency histogram below. Find the median test score.



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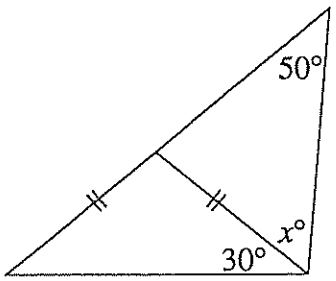
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(j) Find the value of x in the diagram below.



NOT TO SCALE

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(k) Amongst the children in a family a boy has as many sisters as brothers, but each sister has only half as many sisters as brothers.

How many children are in the family ?

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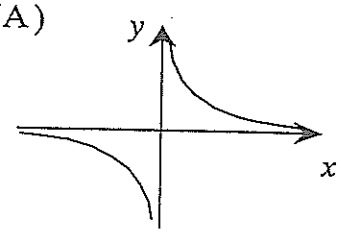
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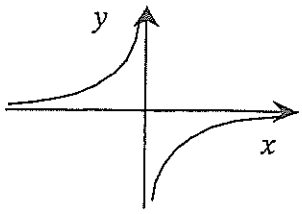
Question 2

(a) Which of the following graphs could represent the equation $xy = 2$?

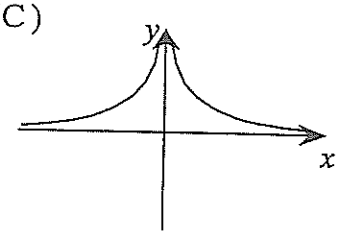
(A)



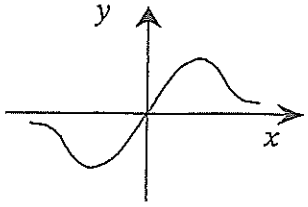
(B)



(C)



(D)



(b) Solve $x^2 + 8x = 20$

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(c) A coin is tossed three times. What is the probability of tossing 2 Heads and 1 Tail ?

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(d) Find the exact volume of a sphere with a radius of 6 centimetres.

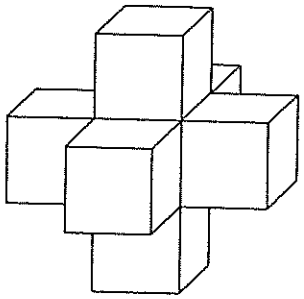
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(e) Seven cubes are glued together face to face as shown in the diagram.
What is the surface area of the solid if its volume is 448 cubic centimetres ?



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(f) A set of scores has a mean of 35 and a standard deviation of 15.
A score of 37 is added to the set of scores.
What will happen to the standard deviation ?

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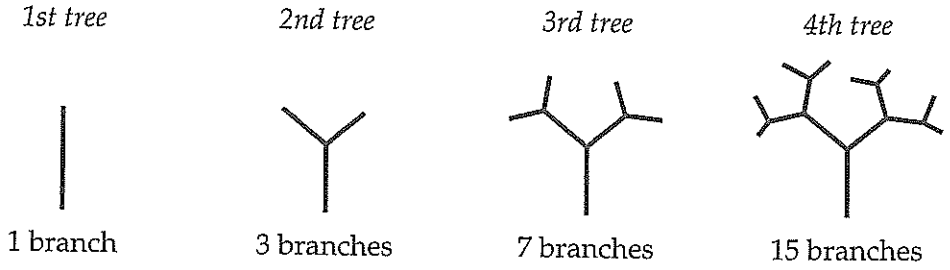
(g) Natasha and Sally are playing a game where a standard six-sided die is rolled once.
Natasha wins if a prime number is rolled. Sally wins if an odd number is rolled.
What is the probability that neither Sally or Natasha win?

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(h) The following four diagrams represent fractal trees.



How many branches would be in the ninth fractal tree ?

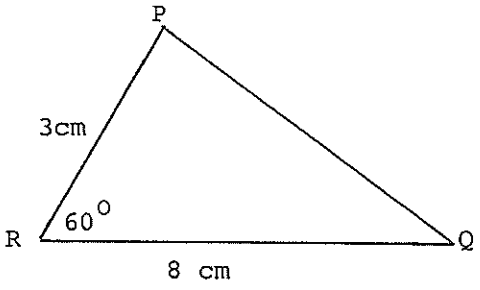
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(i) Find the area of the triangle. (1 decimal place)



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(j) Expand and simplify $(4\sqrt{2}-3)^2$

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(k) The tax payable on taxable incomes is given by:

Taxable Income	*Tax on this income*
\$1 - \$6000	Nil
\$6001 - \$20 000	17 cents for each \$1 over \$6000
\$20 001 - \$50 000	\$2380 + 30 cents for each \$1 over \$20 000
\$50 001 - \$60 000	\$11 380 + 42 cents for each \$1 over \$50 000
\$60 001 and over	\$15 580 + 47 cents for each \$1 over \$60 000

Calculate the tax payable on a taxable income of \$35 850.

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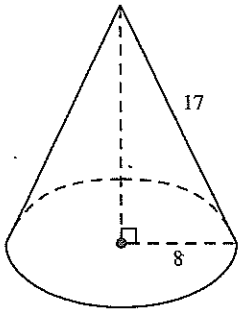
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Question 3

(a) Calculate the exact surface area of the cone shown below.



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(b) Solve simultaneously for x and y

$3x + 4y = 3$ and $x - 2y = 6$

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(c) A new car is worth \$45 000. It depreciates at 20% per annum.
Find the value of the car after six years.

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(d) Draw a neat sketch of the parabola $y = 4x - x^2$, clearly showing the x intercepts.

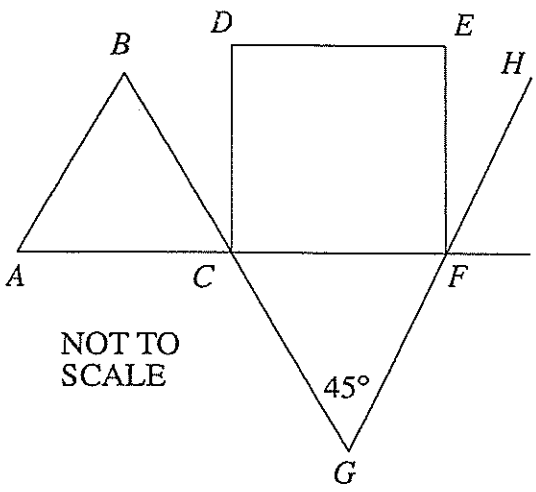
(e) Find the equation of the line that passes through the point $(-3, 4)$
and is parallel to the y axis.

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(f) ABC is an equilateral triangle.
CDEF is a square.
BCG, ACF and GFH are straight lines. $< CGF = 45°$. Find the size of $< EFH$.



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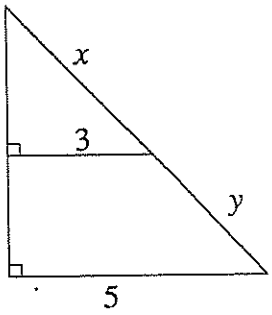
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(g)



Which of the following is true?

(A) $3x = 5y$
(B) $3y = 5x$
(C) $3x = 5(x + y)$
(D) $5x = 3(x + y)$

(h) A normal pack of playing cards has 52 cards. 26 of these are black and 26 are red. The cards are shuffled and a card is drawn out and kept. This card is black. Another card is drawn out.
What is the probability that the second card is black?

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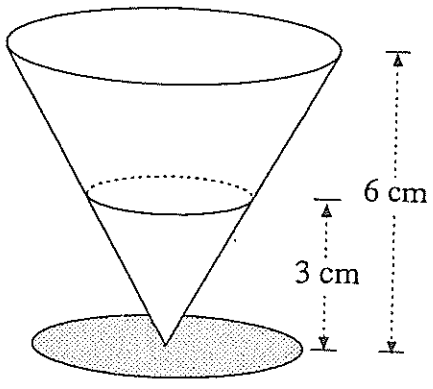
(i) Two fractions are equally spaced between $\frac{1}{4}$ and $\frac{2}{3}$.
Find the smaller of the two.

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(j)



A medicine glass in the shape of a cone has a height of 6 cm. 3 mL of liquid fill the cone to a height of 3 cm. How many more millilitres of liquid are required to fill the cone to a height of 6 cm ?

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Question 4

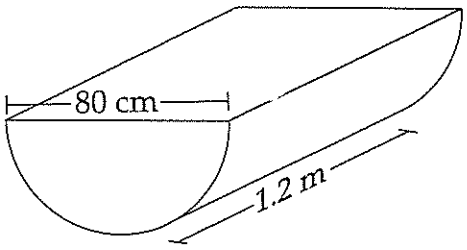
(a) Find the vertex of the parabola $y = x^2 - 4x + 8$

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(b) The following diagram shows half a solid cylinder.
Calculate its surface area in square metres.
(correct to 2 decimal places)



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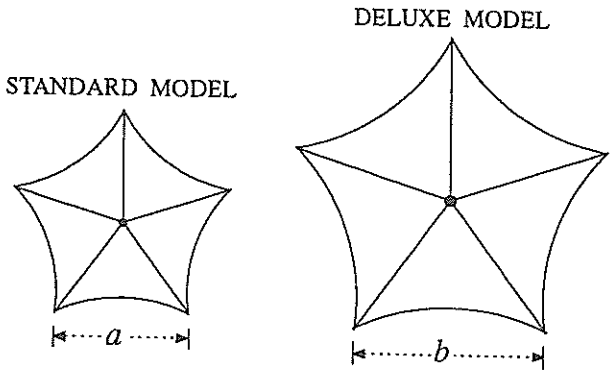
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(c)



The two umbrellas above are similar shapes with $a : b = 4 : 5$.
The standard model requires 1.44 square metres of material.
How much material is required for the deluxe model?

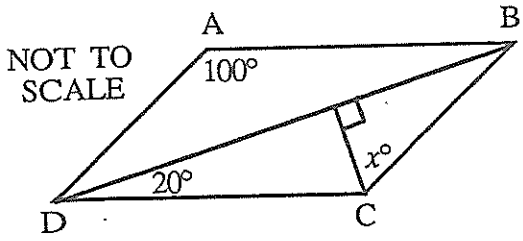
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(d)



ABCD is a parallelogram.

Find the value of x ?

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(e) A two digit number is to be formed at random from the digits 4 , 5 , 7 , 9.
No digit is repeated.
Find the probability that the number formed is greater then 57.

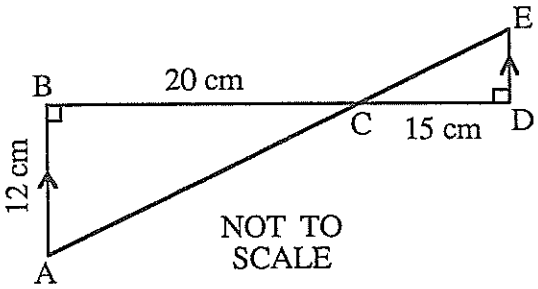
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(f) Find the length of DE.



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(g) Find the surface area of a square pyramid with
base length 40 cm and perpendicular height 48 cm.

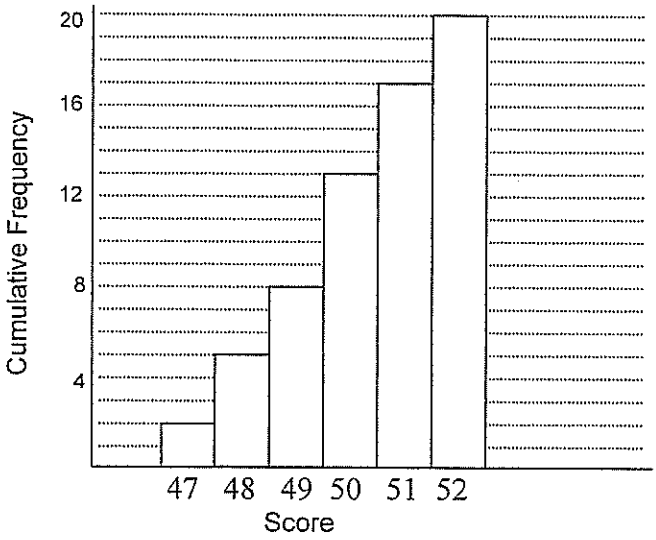
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(h) The number of matches in twenty boxes is illustrated in the following cumulative frequency histogram.



(i) Find the median of the above scores.

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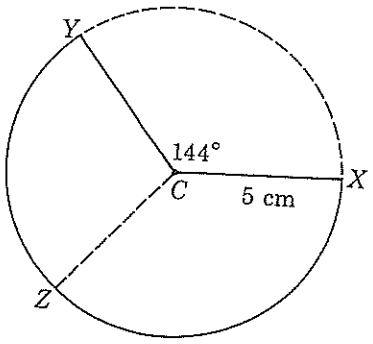
(ii) Find the mode of the above scores.

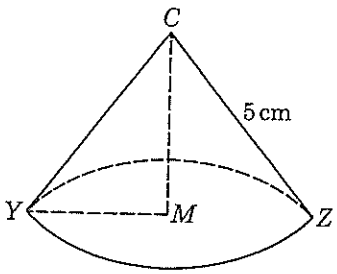
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(i) A circular piece of paper with radius 5 cm has the sector containing an angle of 144° removed. The remaining sector is folded to make a right circular cone.

Find the volume of the cone. (Give your answer in terms of π)





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Question 5

(a) The following stem-and-leaf plot represents the results of a class project.

Stem	Leaf
1	0 7 8
2	1 2 4 6 9
3	7 7 7 8 8 9
4	0 0 6 7 8 8 9
5	1 4

(α) Find the median score.

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(β) Find the interquartile range

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(b) Find the exact solutions of $2x^2 + 5x - 1 = 0$.

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(c) Use the cosine rule to find, correct to the nearest degree,
the largest angle in a triangle with sides 12 cm , 16 cm and 18 cm.

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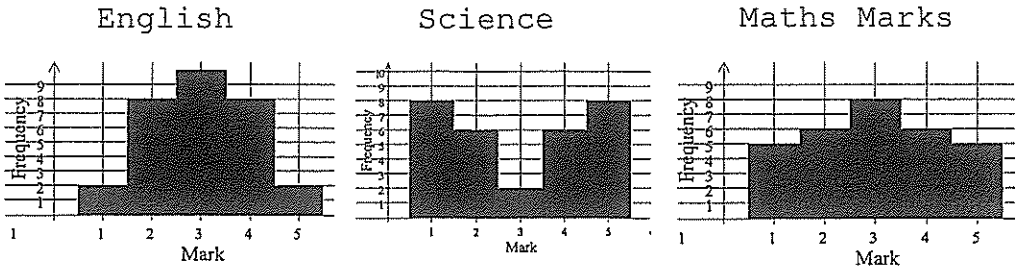
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(d) The following graphs show the distribution of test marks from the same class in English, Mathematics and Science – the important subjects.

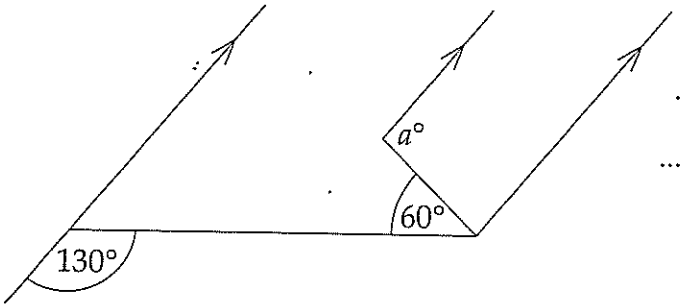


For which subject have these results got the greatest standard deviation?

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(e) Find the value of a.



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(f) Find the gradient of a line that is perpendicular to the line passing through the points $(7, 1)$ and $(5, -3)$.

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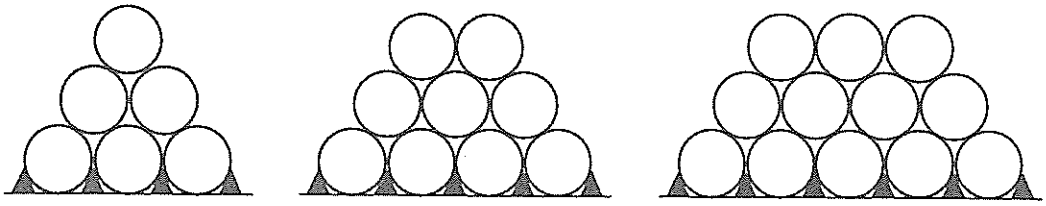
(g) Find the value of k if $x = -2$ is a solution of the equation $x^2 - 3x + k = 0$.

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(h)



Rows of drums are stacked three high, as shown in the diagrams. They are held in position by wedges (▲). How many drums can be held in position by n wedges?

(A) $n(n-1)(n-2)$

(B) $(n-1)(n-2)(n-3)$

(C) $3n-6$

(D) $3n-3$

(i) If $x+y=8$ and $x^2-y^2=36$ find the value of $x-y$.

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(j) A computer is programmed to scan the digits of the counting numbers.

For example, if it scans **1 2 3 4 5 6 7 8 9 10 11 12** then it has scanned 15 digits.

The computer begins its task and scans the first 1788 digits.

Find the last counting number scanned.

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End of Test.