

KWAZULU NATAL PROBLEM SOLVING

MATHEMATICS CHALLENGE 2006

GRADE 9

DATE: THURSDAY 24 AUGUST 2006
DURATION: 90 MINUTES

GENERAL INFORMATION

1. Congratulations on being selected to participate in this challenge.
2. This examination paper consists of 20 questions.
3. Enter your final answer in the correct block on the ANSWER SHEET. Working details are not required.
4. Candidates that qualify to the SECOND ROUND will be required to show full working details.
5. Each question is worth 1 point. No marks are deducted for incorrect answers.
6. Calculators or other computing devices are NOT allowed.
7. Some questions have blanks. You are expected to fill in the blanks.
8. For multiple choice questions, write only the LETTER of your choice.
9. Please do not turn over until the invigilator gives you the signal

1. Solve for x if

$$\frac{4}{x} - 2 = 8$$

2. Find a if $a^3 = 512$.

3. If $x = -2$, find the value of $x^6 - x^5$.

4. * is a secret rule that combines two numbers a and b as follows:

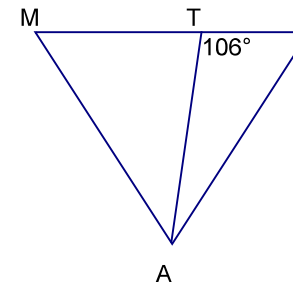
$$a * b = a^2 - b$$

For example:

$$3 * 5 = 3^2 - 5 = 4$$

Calculate $(2 * 1) * 3$.

5. In equilateral $\triangle MAS$, $\angle ATS = 106^\circ$.



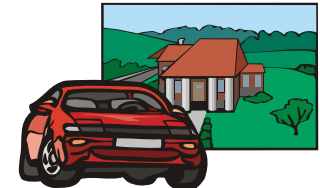
Find the value of angle $\angle MAT$.

6. 2 calculators and 5 books cost R210;



What will 15 books and 6 calculators cost?

7. A car uses 50 litres of petrol for a 600 km journey.



At this rate, how many litres of petrol is required for a trip of 840 km?

8. Find the 6th number in this number pattern :
4; 7; 12; 19; 28;

9. In a triangle, one angle is three times the size of another angle; and the smaller of these two angles is 80° less than the remaining angle.

Determine the size of the smallest angle in this triangle.

10. If $2x^2 + 4xy + 2y^2 = 10$ and $(x + y)^2 m = 80$; find the value of m .

11. A pack of 52 playing cards has 4 shapes: Spades, Hearts,



Clubs and Diamonds. Each shape has the number cards 1 to 10 as well as the picture cards Jack, Queen and King.

At least how many cards must you draw from the pack to be certain of having a Diamond card?

12. 1729 is a *Ramanujan* number.

Fill in the blank box:

$$1729 = 1^3 + 12^3 = 10^3 + \square^3$$

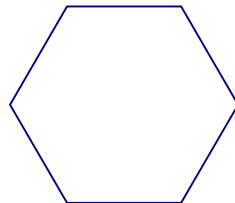
13. If $5! = 1 \times 2 \times 3 \times 4 \times 5$, then find the value of $\frac{20!}{17!}$.

14. On a scale drawing of a rectangular room the length is 6 cm and breadth 4 cm.



If the actual length is 9 m, what is the actual area of the room?

15. By joining the vertices of the hexagon below, how



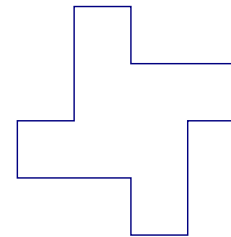
many different triangles of all sizes can be drawn altogether?

16. Suppose in the first round of the 2010 Soccer World Cup there are 8 groups of 8 teams each and every team plays every other team in that group.

In the second round, the top 2 teams in each of the 8 groups go forward and play a knock-out format where losers drop off and half the teams go to the next stage until there is a champion.

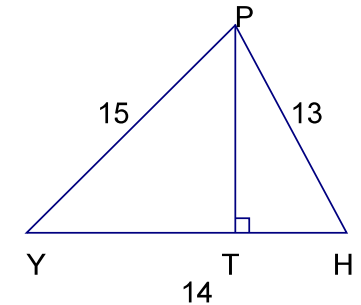
How many games will there be in the 2010 World Cup in South Africa?

17. In the sketch, all the long lines are twice as long as the short lines.



All the angles are right angles. If the area of the shape is 200 cm^2 , find the perimeter of the shape.

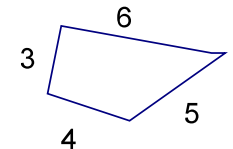
18. In the sketch, $PT \perp YH$. $PY = 15 \text{ cm}$, $YH = 14 \text{ cm}$ and $PH = 13 \text{ cm}$.



Find PT .

19. What is the maximum number of pieces you can cut up a roti (flat round Indian bread) if you are allowed to make 18 straight line cuts?

20. The sides of a convex quadrilateral ABCD are 3, 4, 5 and 6 cm in that order.



If any three vertices are chosen to form a triangle, at most how many isosceles triangles are possible?