4th week

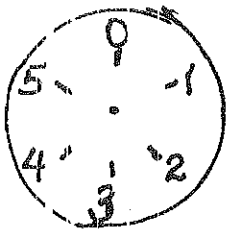
'92

91

March 92

CATEGORY 1
NUMBER THEORY
MARCH, 1992

1. _____
2. _____
3. _____

1. 

USE THE MODULO 6 CLOCK TO FIND $5 \times 2 - 3$ IN MOD 6.

2. FIND THE 33RD DIGIT IN THE DECIMAL REPRESENTATION OF $83/101$

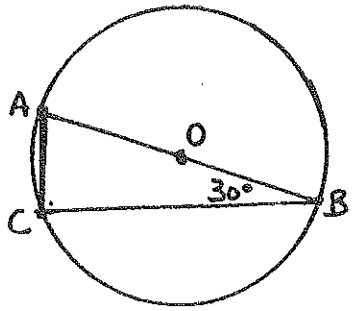
3. WHAT IS THE SUM OF THE FIRST 82 TERMS OF THIS SEQUENCE: 3, 7, 11, 15...

CATEGORY 2
GEOMETRY
MARCH, 1992

1. _____ °

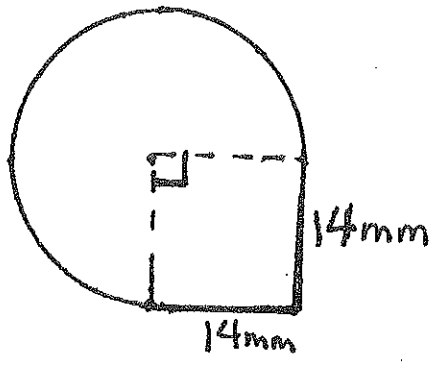
2. _____ mm

3. _____ cm^2



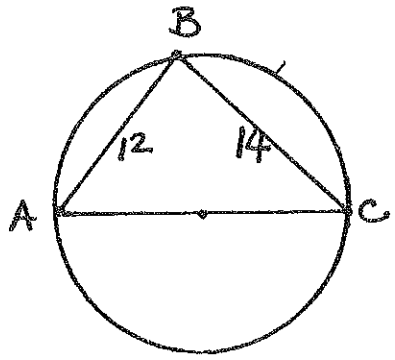
$\overline{AB}$ IS A DIAMETER
$m\angle ABC = 30°$
Find $m\overset{\frown}{BC}$

2.



FIND THE PERIMETER
(USE 3.14 FOR π)
ROUND TO THE NEAREST TENTH.

3.



$\overline{AC}$ IS A DIAMETER
AB = 12 cm
BC = 14 cm

FIND THE AREA OF THE CIRCLE.
ROUND TO THE NEAREST TENTH.

CATEGORY 3
MYSTERY
MARCH, 1992

1. _____
2. _____
3. _____ km/h

1. WHAT IS 50% OF $\frac{1}{80}$? EXPRESS AS A DECIMAL.

2. THE AVERAGE OF 10 NUMBERS IS 240. IF EACH NUMBER IS INCREASED BY 12.5% WHAT WILL THE NEW AVERAGE BE?

3. JAKE RUNS TO SCHOOL AT AN AVERAGE RATE OF 8 km/hr AND RUNS HOME BY THE SAME ROUTE AT A RATE OF 12 km/hr. WHAT IS HIS AVERAGE RATE FOR THE ROUND TRIP?

CATEGORY 4
ARITHMETIC
MARCH, 1992

1. $
2. $
3. $

1. ANDY PURCHASED A JACKET AT A 35% DISCOUNT. IF THE ORIGINAL PRICE WAS $64.20, HOW MUCH DID HE SAVE?

2. THE SALESTAX RATE IN ILLINOIS IS 6%. IF KAREN PURCHASED ITEMS IN CHICAGO AND THE SALES TAX WAS EXACTLY $.42, HOW MUCH CHANGE DID SHE RECEIVE FROM THE $20 BILL SHE GAVE THE CLERK?

3. A USED CAR SALESMAN SOLD A CAR FOR $12,500.50. BASED ON HIS COST HE MADE A 15% PROFIT. HOW MUCH PROFIT DID THE SALESMAN MAKE?

CATEGORY 5
ALGEBRA
MARCH, 1992

1. _____
2. _____
3. _____

1. FIND THE 3RD OF 4 CONSECUTIVE ODD INTEGERS IF THE SUM OF THE FIRST TWO IS FOUR TIMES THE LARGEST.

2. MAUD'S AGE IS $\frac{5}{8}$ OF BARB'S AGE.
BARB'S AGE IS $\frac{2}{5}$ OF PHIL'S AGE.
IF THE SUM OF MAUD'S AGE AND BARB'S AGE IS 26, HOW OLD IS PHIL?

3. LLOYD DEPOSITED $170 IN THE BANK. THE NUMBER OF $5 BILLS WAS 3 TIMES THE NUMBER OF $10 BILLS. THE NUMBER OF $1 BILLS WAS 30 MORE THAN THE NUMBER OF $5 BILLS. HOW MANY $1 BILLS DID HE DEPOSIT?

CATEGORY 6
TEAM QUESTIONS
MARCH, 1992

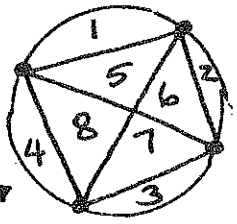
1. A = _____
2. B = _____
3. C = _____
4. D = _____
5. E = _____
6. F = _____

1. SUCCESSIVE DISCOUNTS OF 10%, 20% AND 50% WOULD BE THE SAME AS A SINGLE DISCOUNT OF WHAT PERCENT?

2. A RECTANGLE HAS A LENGTH OF 16 AND A WIDTH OF 32. IF THE LENGTH IS DECREASED BY 37.5% AND THE WIDTH IS INCREASED BY 50%, BY WHAT PERCENT DOES THE AREA DECREASE?

3. EACH OF THE INTERIOR ANGLES OF A REGULAR POLYGON IS 144°. HOW MANY DIAGONALS DOES THIS POLYGON HAVE?

4. IF PAIRS OF POINTS ON A CIRCLE ARE CONNECTED BY SEGMENTS, THE CIRCLE IS DIVIDED INTO REGIONS. FOUR POINTS RESULT IN A MAXIMUM OF 8 REGIONS.



IF SEVEN POINTS ARE CONNECTED BY SEGMENTS WHAT WILL BE THE MAXIMUM NUMBER OF REGIONS?

5. A TRAIN TRAVELING 72 FT/SEC TAKES 37.5 SEC. TO ENTER A TUNNEL AND ANOTHER 2 MIN. TO PASS COMPLETELY THROUGH IT. WHAT IS THE LENGTH OF THE TRAIN IN YARDS?

6. $F + C = E \div \left(\frac{D}{A}\right) \div B$

(Remember: Percent signs are part of the answer to questions 1 and 2 and therefore must be used in doing question #6)

ANSWERS

CAT 1

1) 1. $5 \times 2 = 4$, $4 - 3 = 1$

2) 8 $83/101 = .8217$

3) 13,530 82^{nd} term $= 4 \times 82 - 1 = 327$

3, 7, 11, 15 ... 327

330 x 41 pairs = 13,530

CAT 2

1) 120° $m\angle A = 60° \therefore m\overset{\frown}{BC} = 120°$

2) 93.9mm $P = \frac{3}{4}\pi d + 28$

$P \approx \frac{3}{4}(3.14)28 + 28$

$P \approx 93.94$

3) 266.9 cm^2 $12^2 + 14^2 = AC^2$

$\sqrt{340} = AC$

$\frac{\sqrt{340}}{2} = r$

$A = \pi r^2$

$A = 3.14\left(\frac{\sqrt{340}}{2}\right)^2$

$A = 3.14\left(\frac{340}{4}\right)$

$A = 266.9$

CAT 3

1) .00625 $(1 \div 80) \cdot .5$

2) 270 $(125)(240) = 30$

$240 + 30 = 270$

3) 9.6 kmh COULD BE DONE ALG. BEST DONE BY SELECTING SAMPLE DISTANCE

CAT 4

1) $22.47 $.35 \cdot 64.20$

2) $12.58 $.06x = \$.42$

$x = 700$

3) $1630.50 $20 - 7.42 =$

$.15C + C = 12,500.50$

$C = 10870$

$P = 12500.50 - 10870$

CAT 5

1) −7 $x + x + 2 = (x + 6)4$

$2x + 2 = 4x + 24$

$-22 = 2x$

$-11 = x$ $-11, -9, -7, -5$

2) 40 $\frac{5}{8} \cdot \frac{2}{5}P + \frac{2}{5}P = 26$

$\frac{13}{20}P = 26$

$P = 40$

3) 45 $10B + 3(5)B + 3B + 30 = 170$

$13 = r$

CAT 6

1) 64 % $100\% - 10\% = 90\%$

$20\% \text{ of } 90\% = 18\%$

$90\% - 18\% = 72\%$

$50\% \text{ of } 72\% = 36\%$

$72\% - 36\% = 36\%$

$16 \cdot 32 = 512$

$10 \cdot 48 = 480$

$32/512 = 6.2$

2) $6\frac{1}{4}\%$ (OR) 6.25%

3) 35 $(180 \times 8) \div 10 = 1$

$\therefore$ 10 sided

chart pattern

7 diagonals for pentagon

4) 64 find pattern

5) 900yd $72 \times 37.5 \div 3 =$ other info. is superfluous

6) 109