Short Cuts-Open

1. $\frac{360}{8^\circ} = 45$ D

2. $\log_{10}(\log_2(\log_4 x)) = 0$
$\log_2(\log_4 x) = 1$
$\log_4 x = 2$
$x = 4^2 = 16$
D

3. try all of them
A- plug in $-9 = -288$
B- plug in $1 = -28$
C- plug in $3 = 0$
C works C

4. $x = \sqrt{12+x}$
$x^2 - x - 12 = 0$
$(x-4)(x+3) = 0$
$x = 4$
B

5. synthetic division
1 | 1 ... -4 5 0 -5
1 1 -3 2 2
1 -3 2 2 -3
C

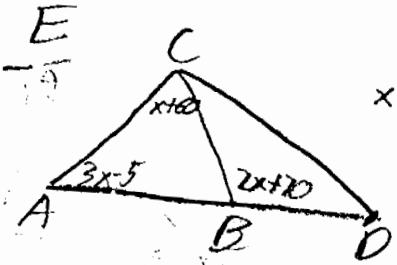
6. A


$\frac{a+b-c}{2}$
$\frac{15+8-17}{2} = 3$

7. $(1-i)^2$
$1-2i+i^2$
$(-2i)^{10} = 1024i^{10} = -1024$
A

8. $x^2+y^2 = 10$
$x^2-2xy+y^2 = 2$
C $-2xy = -6$
$xy = 4$

9. $(.8)(.8)(1.2)(1.2)$
$.9216 - 1 = -7.8\%$
E

10. E


$x+60+3x-5 = 2x+70$
$4x+55 = 2x+70$
$2x = 15$
$x = 7.5^\circ$
$CBA = 95^\circ$
E

11. hour hand $= 180^\circ + \frac{42}{60}$
minute hand $= \frac{42}{60} \cdot 360 =$
$252 - 201 = 51$

12. $x^4+4x^3-8x^2+16x-32 = 0$
$-\left(\frac{\text{second to last}}{\text{last}}\right) = -\left(\frac{16}{-32}\right)$
$\frac{1}{2} = .5 = C$

13. 5=1 10=2 15=3 20=
25=6 45=10 50=12 70=
75=12 80=22 100=24
B

14. $x = \sqrt{3+2\sqrt{2}} - \sqrt{3-2\sqrt{2}}$
$\sqrt{5.8} - \sqrt{.2}$
$2.4 - .4 = 2$ C
see the end of this solutions section.

15. E I think it's Ans. Richard K

16. 3 | 30 -a b -2
0 9 27 81-3a 243-9a+3b
3 9 27-a 81-3a
$243-9a+3b-2 = 27$
$-9a+3b = 30$
-3 | 30 -a b -2
0 -6 12 24-2a 48-4a+2b
-6 12-a 24-2a+b 34
E $46-4a-2b = 34$
$2a+b = 16$

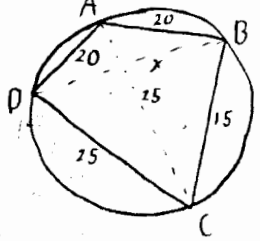
17. 90, 90, 85, $x+y = 415$
$x+y = 150$
$x = 85$
$y = 65$
C

18. $\frac{180(x-2)}{x} = 13\left(180 - \frac{180(x-2)}{x}\right)$
$180x - 360 = 2340x - 2340x +$
$2340x^2 + 180x - 5040 = 0$
$13x^2 + x - 28 = 0$
$180x = 5040$
$x = 28$
$28 \cdot 25 = 350$ C

19. $4^5 = 1024$ C

20. $2^{11} = 2048$
1 ← 0
1 1 ← 1
1 2 1 ← 2
1 3 3 1 ← 3
$2^{12} = 4096$ d

21.



(AB)(DC) + (AD)(BC) = (BD)(AC)

$20 \cdot 25 + 20 \cdot 15 = x \cdot 25$

$800 = 25x \quad x = 32$

D

22. Repeats every 21

1, 2, 4, 5, 8, 10, 11, 13, 16, 17, 19, 20 $\frac{12}{21}$. 95 2015, +

1996, 1997, ~~1999~~

95, 12 + 3 = 1143

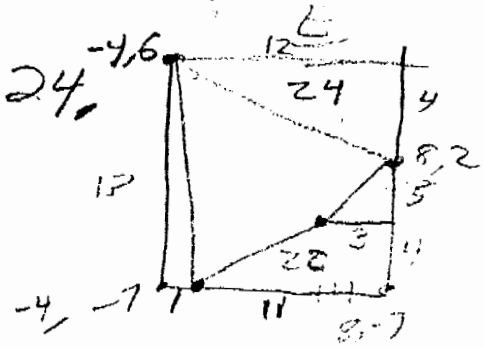
E

23. $3x^2 - 4x - 1$

$\frac{4 \pm \sqrt{16+12}}{6} \quad \frac{2}{3} \pm \frac{\sqrt{7}}{3}$

C

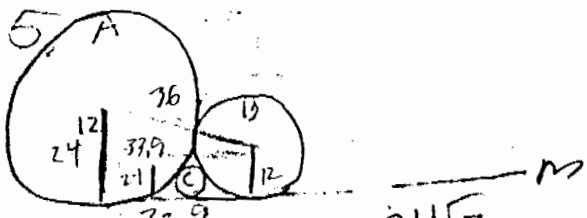
24.



$12 \cdot 13 = 156 - 24 - 7.5 - 28 - 65$

A

25.



E $\quad 24\sqrt{2}$

STEP ONE

$\frac{-b_0}{a_0} = r + s$

$\frac{c_0}{a_0} = rs$

$\frac{-b_1}{a_1} = a_0 r + a_0 s + 2b_0$

$\frac{+c_1}{a_1} = a_0^2 rs + b_0(a_0 r + a_0 s) + b_0^2$

STEP TWO

$-b_0 = a_0 r + a_0 s$

$c_0 = a_0 r s$

$\frac{-b_1}{a_1} = -b_0 + 2b_0 = b_0$

$\frac{c_1}{a_1} = a_0 c_0 + b_0 \cdot b_0 = b_0 + b_0 = a_0 c_0$

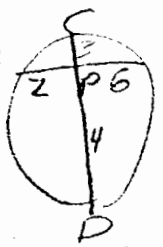
assume $a_0 = 1$

$x^2 - b_0 x + a_0 c_0$

27. $1 + \sqrt{3}$

~~E~~ A find a

28.



?

29. a, b, c, d - add up to 10

10-0-0-0 = 1 way

9-1-0-0 = 3 ways

8- = 6 ways

7- = 10 ways

6- = 15 ways

5- = 21 ways

4 = 28 ways

3 = 36 ways

2 = 45 ways

1 = 55 ways

0 = 66 ways

286 C

30. $\frac{1}{2} + 1 + \frac{3}{2} + 2 + \frac{5}{2} + 3 + \frac{7}{2} + 4, \ldots, 49\frac{1}{2}$

$\frac{99 \cdot 100}{2 \cdot 2} = 2475$

D

$ax^2 + bx + c = 0$

(26) Given a polynomial $p(x)$, a polynomical with roots "a" times as $p(x)$ is $p\left(\frac{x}{a}\right)$. And a polynomical with roots "b" more than $p(x)$ is $p(x-b)$. See the pattern?

$$p(x) = ax^2 + bx + c$$

$$p\left(\frac{x}{a}\right) = a\left(\frac{x}{a}\right)^2 + b\left(\frac{x}{a}\right) + c = \frac{x}{a} + \frac{b}{a}x + c$$

Multiply the polynomial by a. It won't change the value of the roots.

$$p\left(\frac{x}{a}\right) = x^2 + bx + ac$$

Now, next step.

$$p\left(\frac{x}{a} - b\right) = (x-b)^2 + b(x-b) + ac$$

$$x^2 - 2xb + b^2 + bx - b^2 + ac$$

$$x^2 - bx + ac$$

B

(15) $x = \sqrt{3+2\sqrt{2}} - \sqrt{3-2\sqrt{2}}$

Square both sides:

$$x^2 = (3+2\sqrt{2}) - 2\sqrt{(3+2\sqrt{2})(3-2\sqrt{2})} + (3-2\sqrt{2})$$

$$x^2 = 6 - 2\sqrt{9-8}$$

$$x^2 = 4$$

$$x = \pm 2$$

Since the square roots were there to begin with, we want the positive root, 2.

C