1. Select equivalent expressions AND solve.

$$|x + 6| = \frac{1}{x + 3} + 4$$

A $\left[x = \frac{1}{2}\sqrt{21} + \frac{1}{2}, x = -\frac{1}{2}\sqrt{37} - \frac{1}{2}\right]$

B $\left[x = \frac{10}{\sqrt{5}-5}, x = -\frac{10}{\sqrt{5}+5}, x = \frac{62}{3\sqrt{5}-13}\right]$

C $\left[x = \frac{1}{2}\sqrt{29} - \frac{5}{2}\right]$

D $\left[x = -\frac{3}{2}\sqrt{5} - \frac{7}{2}, x = -\frac{1}{2}\sqrt{13} - \frac{3}{2}, x = \frac{1}{2}\sqrt{13} - \frac{3}{2}\right]$

E none of these

2. Suppose

$$f(x) = 64^{8x-4}$$

Solve for x in the following equation

$$f(x) = 65536$$

A $\left[x = \left(-\frac{3}{25}\right)\right]$

B $\left[x = \left(\frac{5}{6}\right)\right]$

C $\left[x = \left(-\frac{9}{25}\right)\right]$

D $\left[x = \left(\frac{17}{12}\right)\right]$

E $\left[x = \left(\frac{4}{21}\right)\right]$

F none of these

3. Suppose $g : \mathbf{U} \to \mathbf{U}$ with

$$g(x) = 5x^2 - 6$$

determine expression/s equivalent to

$$\frac{g(x + h) - g(x)}{h}$$

A $\frac{5h^2 + 10hx + 10x^2 - 12}{h}$

B $5h + 10x$

C $\frac{5\left(4h^2 + 4hx + x^2 - 2\right)}{h}$

4. Select equivalent expressions AND solve.

$$-\frac{2}{x^2 - 1} + \frac{1}{x - 1} - \frac{3}{(x^2 - 1)(x - 1)} = \frac{1}{x^2 - 1}$$

A $\left[x = -\frac{1}{2}\sqrt{33} - \frac{3}{2}, x = \frac{1}{2}\sqrt{33} - \frac{3}{2}\right]$

B $\left[x = (-i + 3), x = (i + 3)\right]$

C $\left[x = -\frac{1}{2}\sqrt{13} + \frac{3}{2}, x = \frac{1}{2}\sqrt{13} + \frac{3}{2}\right]$

D none of these

5. Solve the equation.

$$\left(\frac{1}{125}\right)^{6x+5} = 5^{-x-3}$$

A $\left[x = \left(-\frac{4}{5}\right)\right]$

B $\left[x = \left(\frac{1}{3}\right)\right]$

C $\left[x = \left(\frac{7}{3}\right)\right]$

D $\left[x = \left(-\frac{12}{17}\right)\right]$

E $\left[x = \left(-\frac{1}{5}\right)\right]$

F none of these

6. Assume $A \neq 0$ and is real, suppose

$$f(t) = Ae^{(-t)}$$

   Solve for t in the following equation

$$f(t) = \frac{1}{5}A$$

A	$\left[t = \frac{19}{4}\log(11)\right]$
B	$\left[t = \log(5)\right]$
C	$\left[t = \frac{15}{4}\log(6)\right]$
D	$\left[t = \frac{5}{2}\log(3)\right]$
E	$\left[t = 11\log\left(\frac{11}{2}\right)\right]$
F	none of these

7. Suppose $q : \mathbf{U} \to \mathbf{U}$ with

$$q(x) = x$$

   determine expressions equivalent to

$$q(u-2)$$

A	$u - 2$
B	$u + 4$
C	$u - 8$

8. Suppose we define $x \heartsuit y$ to be $|x - y|$ for any real numbers x
   and y. Select the true statement/s

   A
   $$2(x \heartsuit y) = 2y \heartsuit 2x$$
   for all real x and y

   B
   $$x \heartsuit y = y \heartsuit x$$
   for all real x and y

   C
   $$x \heartsuit x = 0$$

   for all real x

   D
   $$x \heartsuit 0 = x$$

   for all real x

   E
   $$x \heartsuit y > 0$$
   if $x \neq y$

F	none of these

9. Congress is debating a proposed law to lower taxes. If the
   current tax rate is $r = 8\%$, then the proposed rate after x
   years is given by the formula:

   $$\frac{r}{1 + \frac{1}{1 + \frac{1}{x}}}$$

   . What will the approximate tax rate be in 15 years?

A	$\frac{208}{51}\%$

B	$\frac{128}{31}\%$
C	$\frac{104}{17}\%$
D	$\frac{248}{61}\%$
E	$\frac{60}{11}\%$
F	none of these

10. Suppose $f(x) = 2x$ determine if

$$f(-10y) = -10f(y)$$

A	True
B	False

11.

Suppose $p : \mathbf{U} \to \mathbf{U}$ with

$$p(x) = -4\,x^2 + 2$$

determine expression/s equivalent to

$$p\left(\frac{y-4}{\beta-4}\right)$$

A	$-\frac{4\,(y-4)^2}{(\beta-4)^2} + 2$
B	$-\frac{4\,y^2}{(\beta-3)^2} + 2$
C	$-\frac{4\,(y-3)^2}{(\beta-2)^2} + 2$

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12. The number

$$6000 \cdot (6000)^{6000}$$

is the same as which of the following?

A	12000^{6001}
B	$6000^{36000000}$
C	36000000^{12000}

D	36000000^{6000}
E	6000^{12000}
F	12000^{6000}
G	6000^{6001}
H	none of these

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13. Simplify: $\frac{6\,y^4 + 2\,x}{2\,x^3\,\frac{3}{3}\,2\,y}$

A	$-\frac{3\,y^3}{x^4}$

B	$\frac{3\,y^4 + x}{x^3 - y}$

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14. If x is the average of $5\,m$ and 3, y is the average of $5\,m$ and 9, and z is the average of $2\,m$ and 6, what is the average of x, y, and z?
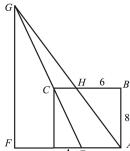
A	$2\,m + \frac{7}{3}$
B	$\frac{3}{2}\,m + 3$

C	$\frac{5}{3}\,m + \frac{14}{3}$
D	$\frac{11}{6}\,m + \frac{11}{3}$
E	$2\,m + 3$
F	none of these

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15. In rectangle ABCD, we have AB = 8, BC = 9, H is on BC with BH = 6, E is on AD with DE =4, line EC intersects line AH at G, and F is on line AD with GF ⊥ AF . What is the length GF

?

A	30
B	16
C	28
D	24
E	20
F	none of these

---

16. Solve the following linear equation

$$\frac{x+1}{2} = 3\,(2\,x + 2)$$

A	$x = \left(\dfrac{45}{14}\right)$

B	$x = \left(\dfrac{20}{17}\right)$

C

D

$$x = \left(\frac{26}{15}\right)$$

$$x = (-1)$$

E   none of these

---

17. Suppose a, b and c are (non-specific) real values. Select the correcect expansion of the following polynomials.

A
$$(ab)^4 = a^4 \cdot b^4$$

B
$$(a + b)^2 = a^2 + b^2$$

C
$$(a + b)^3 = a^3 + 3ab + b^3$$

D
$$(a + b)^4 = a^4 + b^4$$

E
$$(a + b)^3 = a^3 + b^3$$

F
$$(a + b + c)^2 = a^2 + b^2 + c^2$$

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18. compute
$$\left(4x^5 + 2x^2 + 5\right) \div \left(2x^3\right)$$

A $2x^2 + \frac{2x^2+5}{2x^3}$

B $20x^2 + \frac{2x^2+5}{2x^3}$

C $2x^2 + \frac{2x^2+9}{2x^3}$

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19. Solve the following linear equation
$$\frac{2x + 2}{3} = 3(x - 1)$$

A
$$x = \left(\frac{3}{2}\right)$$

B
$$x = \left(\frac{11}{7}\right)$$

C
$$x = 2$$

D
$$x = 1$$

E   none of these

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20. PP3

Perfect Cube: Multiply
$$(x + y)^3$$

A
$$x^3 + 3xy + y^3$$

B
$$x^3 + 2xy + y^3$$

C
$$x^3 + 3x^2y + 3xy^2 + y^3$$

D   none of these

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1) B, 2) B, 3) B, 4) C, 5) D, 6) B, 7) A, 8) ABCE, 9) B, 10) A, 11) A, 12) G, 13) B, 14) E, 15) E, 16) C, 17) A, 18) A, 19) B, 20) C