Learning Enhancement Team

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STUDENT SUPPORT SERVICE

Model Answers: BODMAS

BODMAS stands for
Brackets
Order
Divide
Multiply
Add
Subtract

BODMAS study guide

a. Perform the multiplication before the addition, as $5\times2=10$:
$5\times2+3=10+3=13$

b. Perform the multiplication before the addition, as $2\times5=10$:

$3+2\times5=3+10=13$

c. Perform the multiplication before the subtraction, as $6\times2=12$:

$20-6\times2=20-12=8$

d. Perform the mathematics in brackets before the multiplication, as $20-6=14$:

$(20-6)\times2=14\times2=28$

e. Perform the division before the addition, as $24\div4=6$:

$24\div4+6=6+6=12$

f. Perform the mathematics in brackets before the division, as $5+3=8$:

$24\div(5+3)=24\div8=3$

g. Here you have two multiplications, both of which must be performed before the subtraction. As $8\times 4=32$ and $3\times 5=15$ you have:

$$8\times 4-3\times 5=32-15=17$$

h. You have an addition, a multiplication and an order (squaring). You perform the squaring first, as $3^2=3\times 3=9$:

$$6+4\times 3^2=6+4\times 9$$

Next perform the multiplication, as $4\times 9=36$ you get:

$$6+4\times 9=6+36=42$$

i. You have brackets, a division and a subtraction. Firstly perform the mathematics in brackets, as $4+2=6$ you have:

$$36\div(4+2)-3=36\div 6-3$$

Next perform the division, as $36\div 6=6$:

$$36\div 6-3=6-3=3$$

j. You have brackets, a multiplication, a subtraction and an order (squaring). Firstly perform the mathematics in brackets, as $6+5=11$ you have:

$$(6+5)\times 3-4^2=11\times 3-4^2$$

Now perform the order, as $4^2=4\times 4=16$ you have:

$$11\times 3-4^2=11\times 3-16$$

Next perform the multiplication $11\times 3=33$ to give:

$$11\times 3-16=33-16=17$$

k. The numerator and denominator of a fraction can be thought of as being two bracketed pieces of mathematics separated by a dividing line.

$$\frac{8+4}{1+5}=(8+4)\div(1+5)$$

So you must perform the mathematics in brackets first. As $8+4=12$ and $1+5=6$:

$$(8+4)\div(1+5)=12\div 6=2$$

Alternatively you can retain the dividing line but you must perform the mathematics in the numerator and denominator **before** the division. Again as the numerator is $8+4=12$ and the denominator is $1+5=6$:

$$\frac{8+4}{1+5}=\frac{12}{6}=2$$

Either way the result is the same. The remainder of this sheet will use the latter method but you may wish to check the answer using the other method.

l. Here the numerator is $9\times 4=36$ and the denominator is $6^2=6\times 6=36$ so:

$$\frac{9\times 4}{6^2}=\frac{36}{36}=1$$

m. Numerator: you must perform the multiplication before the addition to get:

$$6\times 5+5=30+5=35$$

Denominator: $9-2=7$

So:

$$\frac{6\times 5+5}{9-2}=\frac{35}{7}=5$$

n. Numerator: perform the squaring before the subtraction so:

$$49-3^2=49-9=40$$

Denominator: perform the mathematics in the brackets before the multiplication so:

$$5\times(3+5)=5\times 8=40$$

So:

$$\frac{49-3^2}{5\times(3+5)}=\frac{40}{40}=1$$

o. Numerator: perform the multiplication before the addition so:

$$2+6\times 8=2+48=50$$

Denominator: perform the multiplication before the addition so:

$$1+6\times 4=1+24=25$$

So:

$$\frac{2+6\times 8}{1+6\times 4}=\frac{50}{25}=2$$

p. Here you must perform the operations in the fraction before the addition. The numerator is $12\div 4=3$ and so:

$$3+\frac{12\div 4}{3}=3+\frac{3}{3}$$

Now $3\div 3=1$ and so:

$$3+\frac{3}{3}=3+1=4$$

q. The mathematics in brackets must be performed first. In the brackets you have squaring and adding. The squaring must be performed first, so as $3^2=9$ and $4^2=16$:

$$3^2+4^2=9+16=25$$

Using this result in the bracket gives:

$$\left(3^2+4^2\right)\div 5=25\div 5=5$$

r. Firstly perform the mathematics in brackets. As $6+2=8$ and $7\times 2=14$:

$$4\times(6+2)-(7\times 2)=4\times 8-14$$

Next perform the multiplication before the addition, as $4\times 8=32$:

$$4\times 8-14=32-14=18$$

s. This question can cause confusion. However is you think of it as $0-4^2$ you can see that the order (squaring) is performed before the subtraction and so as $4^2=16$:

$$-4^2=0-4^2=0-16=-16$$

t. On first inspection this example seem identical to the previous question however here you square -4 to give $(-4)^2=-4\times -4=16$.

u. Here the divisions are performed left to right and so as $8\div 4=2$:

$$8\div 4\div 2=2\div 2=1$$

v. Here you perform the division in brackets first so as $4 \div 2 = 2$:

$$8 \div (4 \div 2) = 8 \div 2 = 4$$

w. Here perform the division in brackets first so as $4 \div 2 = 2$:

$$8 \div (4 \div 2) \div 2 = 8 \div 2 \div 2$$

And then perform the calculation from left to right as in question u, as $8 \div 2 = 4$:

$$8 \div 2 \div 2 = 4 \div 2 = 2$$

x. Numerator: Perform the multiplication before the subtraction, as $6 \times 3 = 18$:

$$5 - 6 \times 3 = 5 - 18 = -13$$

Denominator: Perform the division before the addition, as $24 \div 2 = 12$:

$$1 + 24 \div 2 = 1 + 12 = 13$$

So:

$$\frac{5 - 6 \times 3}{1 + 24 \div 2} = \frac{-13}{13} = -1$$

y. When you have brackets inside brackets (or nested brackets) you do the mathematics from the inside out, so calculate the innermost brackets first. In this example the innermost bracket is $3 + 4 = 7$ so:

$$\left((3 + 4)^2 - 1\right) \div 3 = \left(7^2 - 1\right) \div 3$$

Now perform the mathematics in the remaining bracket, here the square (order) is performed before the subtraction. As $7^2 = 49$:

$$\left(7^2 - 1\right) \div 3 = (49 - 1) \div 3$$

Now using $49 - 1 = 48$

$$(49 - 1) \div 3 = 48 \div 3 = 16$$

z. Again perform the brackets from inside out. The innermost bracket is $2 - 4 = -2$:

$$\left(5\left(2\left((2 - 4)^2 + 7\right) + 3\right) - 1\right)^2 = \left(5\left(2\left((-2)^2 + 7\right) + 3\right) - 1\right)^2$$

Using $(-2)^2 = -2 \times -2 = 4$, see question t:

$$\left(5\left(2\left((-2)^2 + 7\right) + 3\right) - 1\right)^2 = (5(2(4 + 7) + 3) - 1)^2$$

Now $4+7=11$:

$$(5(2(4+7)+3)-1)^2 = (5(2\times 11+3)-1)^2$$

In the innermost bracket you perform the multiplication before the addition so as $2\times 11=22$:

$$(5(2\times 11+3)-1)^2 = (5(22+3)-1)^2$$

And $22+3=25$:

$$(5(22+3)-1)^2 = (5\times 25-1)^2$$

In the final bracket perform the multiplication before the subtraction, $5\times 25=125$ gives:

$$(5\times 25-1)^2 = (125-1)^2$$

And as $125-1=124$

$$(125-1)^2 = 124^2 = 15376$$