Introduction to Sigma Notation (notes) ANSWERS

Date:

1. For each of the expressions below, show with ***one or more middle steps*** th explicitly (individual terms simplified) as: 4 + 7 + 10 + 13 + 16.

> Ok, so they all end up being the same 5 terms in a series, but all in a very different way.

a) $\sum_{i=1}^{5}(3i+1)$ $= (3(1)+1)+(3(2)+1)+(3(3)+1)+(3(4)+1)+(3(5)+1)$
$= 4+7+10+13+16$

b) $\sum_{k=1}^{5}(3k+1)$ $= (3(1)+1)+(3(2)+1)+(3(3)+1)+(3(4)+1)+(3(5)+1)$
$= 4+7+10+13+16$

c) $\sum_{j=2}^{6}(3j-2)$ $= (3(2)-2)+(3(3)-2)+(3(4)-2)+(3(5)-2)+(3(6)-2)$
$= 4+7+10+13+16$

d) $\sum_{i=3}^{7}(3i-5)$ $= (3(3)-5)+(3(4)-5)+(3(5)-5)+(3(6)-5)+(3(7)-5)$
$= 4+7+10+13+16$

e) $\sum_{i=-2}^{2}(3i+10)$ $= (3(-2)+10)+(3(-1)+10)+(3(0)+10)+(3(1)+10)+(3(2)+10)$
$= 4+7+10+13+16$

f) $\sum_{i=1}^{3}(3i+1)+\sum_{i=4}^{5}(3i+1)$ $= [(3(1)+1)+(3(2)+1)+(3(3)+1)]+[(3(4)+1)+(3(5)+1)]$
$= 4+7+10+13+16$

g) $\sum_{i=1}^{4}(3i+1)+\sum_{i=5}^{5}(3i+1)$ $= [(3(1)+1)+(3(2)+1)+(3(3)+1)+(3(4)+1)]+(3(5)+1)$
$= 4+7+10+13+16$

h) $\sum_{i=1}^{3}(3i+1)+\sum_{i=2}^{3}(3i+7)$ $= [(3(1)+1)+(3(2)+1)+(3(3)+1)]+[(3(2)+7)+(3(3)+7)]$
$= 4+7+10+13+16$

i) $\sum_{i=3}^{7}(3i+1)-\sum_{i=6}^{7}(3i+1)+\sum_{i=1}^{2}(3i+1)$

$= [(3(3)+1)+(3(4)+1)+(3(5)+1)+(3(6)+1)+(3(7)+1)]-[(3(6)+1)+(3(7)+1)]+[(3(1)+1)+(3(2)+1)]$
$= (10+13+16+19+22)-(19+22)+(4+7)$
$= 4+7+10+13+16$

j) $\sum_{i=1}^{3}(6i-2)+\sum_{i=-5}^{-4}(6i+37)$ $= [(6(1)-2)+(6(2)-2)+(6(3)-2)]+[(6(-5)+37)+(6(-4)+37)]$
$= (4+10+16)+(7+13)$
$= 4+7+10+13+16$

2. Show that the following expressions, while not producing the same pattern: 4 + 7 + 10 + 13 + 16, still give the same final numerical answer as the expressions in qu. #1.

a) $\sum_{i=1}^{5}3i+\sum_{i=1}^{5}1$ $= [3(1)+3(2)+3(3)+3(4)+3(5)]+[1+1+1+1+1] = (3+6+9+12+15)+(5) = 50$

b) $3\sum_{i=1}^{5}i+\sum_{i=1}^{5}1$ $= 3(1+2+3+4+5)+(1+1+1+1+1) = 3(15)+(5) = 50$