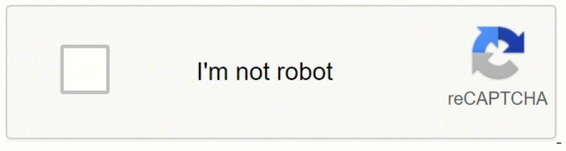

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Negative indices worksheet with answers

Proof 3

For all the questions below, n is a positive integer.

1) Prove that $\frac{1}{4}(2n+1)(n+4)-\frac{1}{4}n(2n+1)=2n+1$

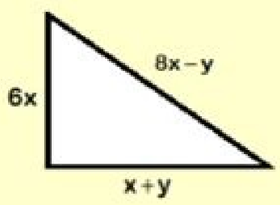
2) Prove that $(4n+2)^2-(2n+2)^2$ is a multiple of 4 for all positive integer.

3) Prove that $(n+1)^2-(n-1)^2+1$ is always odd for all positive integer.

4) Prove algebraically the difference between the squares of any two consecutive even numbers is always a multiple of 4.

5) Prove that for any two numbers the product of their difference and their sum is equal to the difference of their squares.

6) Prove algebraically that $x : y = 2 : 3$



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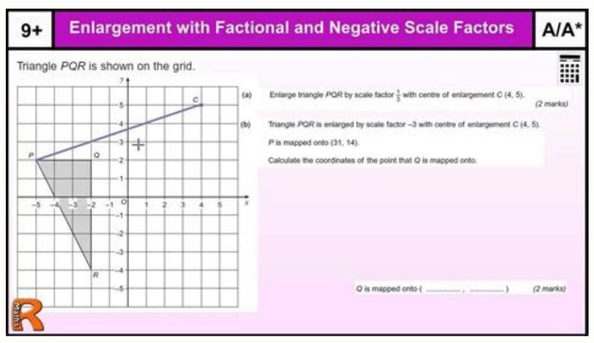


Grammar topic: Question tags ("Frageanhängsel")

Step 1: positive sentence, negative question tag – auxiliary verbs given!

1. The car is in the garage, _____?
2. You are John, _____?
3. My parents were in the library yesterday, _____?
4. He was very tired after the marathon, _____?
5. We could invite all our friends, _____?
6. Mr. Pritchard has been to Scotland recently, _____?
7. The children have finished all the exercises, _____ ?
8. These trips had been very expensive, _____?
9. He will tell her the truth, _____?

Step 2: negative sentence, positive question tag – auxiliary verbs given!

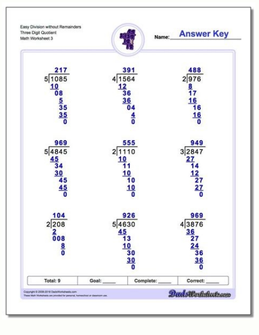
10. Your wife isn't interested in volleyball, _____?
11. These boys aren't good at singing, _____?
12. Columbus wasn't afraid of the long journey, _____?
13. They weren't able to conquer all of Europe, _____?
14. I couldn't sell the tickets at that time, _____?
15. We haven't read all his books, _____?
16. Your pen friend hasn't answered for a long time, _____?
17. The girls won't go to that boring party, _____?
18. She hadn't left the disco alone, _____?

Step 3: positive sentence, negative question tag – no auxiliary verbs given!

19. We visit our grandparents at the weekends, _____?
20. My sister writes thousands of SMS every month, _____?
21. I usually start learning a week before the test, _____?
22. The beautiful lady left the party too early, _____
23. Grandma worked on a huge farm during the war, _____?
24. The soldiers shot at the demonstrators without a warning, _____?
25. Peter and I saw all the football matches on TV, _____?

Step 4:Question tags mixed for experts!

26. Columbus didn't want to stay there any longer, _____?
27. The tiger will kill the boar in a minute, _____?
28. I am very happy at the moment, _____?
29. Peter and Tim are interested in cheap cameras, _____?
30. Helen is going to buy some new T-shirts and skirts, _____?
31. The expedition had reached the summit in time, _____?
32. Your uncle has lived in Canberra for more than 10 years, _____?
33. My cat won't stay in that dog kennel any longer, _____?



Name_____ Period_____

Adding and Subtracting Polynomials

Directions: Add or subtract in the first column to simplify the expression. Write the letter of the simplified expression in the blank next to the matching problem.

Add or Subtract:	Simplified Expression:
_____ 1. $(5x^2 - 3) + (2x^2 - 3x^3)$	a. $2x^4 + 9x^3$
_____ 2. $(4 + 2x^3) + (5x^3 + 2)$	b. $6x^4 - 6x$
_____ 3. $(x^3 - 2x^3) - (3x^3 - 4x^3)$	c. $5x^3 - 5x^2$
_____ 4. $(3x^2 + 1) - (4 + 2x^2)$	d. $2x^3 - 2x^4 + 3x + 3$
_____ 5. $(4x^3 + 3x^4) - (x^4 - 5x^3)$	e. $-2x^3 + 10x^4 + 5x + 14$
_____ 6. $(5x + 4) - (5x + 3)$	f. $-3x^3 + 7x^2 - 3$
_____ 7. $(3x^4 - 3x) - (3x - 3x^4)$	g. $7x^3 - 3x^2 + 20x$
_____ 8. $(-4x^3 + 14 + 3x^2) + (-3x^3 - 14x^2 - 8)$	h. $-8x^4 + 8x$
_____ 9. $(3 - 6x^5 - 8x^6) - (-6x^4 - 3x - 8x^5)$	i. $-7x^4 - 11x^2 + 6$
_____ 10. $(-x^4 + 13x^3 + 6x^2) + (6x^3 + 5x^3 + 7x^4)$	j. $4x^3 - 15x^2 - 11x - 1$
_____ 11. $(9x^3 + 5x^2 + 11x) + (-2x^3 + 9x - 8x^2)$	k. $5x^3 + 23x^2 - 11x$
_____ 12. $(13x^2 + 11x - 2x^4) + (-13x^2 - 3x - 6x^4)$	l. $x^2 - 3$
_____ 13. $(-7x^3 + 14 - 2x) + (10x^4 + 7x + 5x^3)$	m. 1
_____ 14. $(7 - 13x^2 - 11x) - (2x^3 + 8 - 4x^3)$	n. $7x^3 + 6$
_____ 15. $(13x^3 - 6x^3 - 2x) - (-10x^3 - 11x^3 + 9x)$	o. $18x^5 + 6x^4 + 12x$

In other words, the rule can also be written as \textcolor{red}{a}^{\large{\frac{\textcolor{blue}{b}}{\textcolor{limegreen}{c}}}} = (\sqrt[\textcolor{limegreen}{c}]{\textcolor{red}{a}})^\textcolor{blue}{b} You should try to carry out the operations in the order that makes the calculation as simple as possible. we know that 8 = 2^3 This means we can rewrite the following, 8^{-4}=\left(2^3\right)^{-4} Next, using Rule 3, we can simplify, \left(2^3\right)^{-4}=2^{3\times(-4)}=2^{-12} So the whole expression can be written as 2^{15}\times2^{-12}, Finally using Rule 1 we simplify the expression further. \textcolor{red}{64}^{\large{\frac{\textcolor{limegreen}{2}}{\textcolor{blue}{3}}}}= \sqrt[\textcolor{blue}{3}]{\textcolor{red}{64}^\textcolor{limegreen}{2}} \sqrt[\textcolor{blue}{3}]{\textcolor{red}{64}} = \textcolor{red}{4} \textcolor{red}{4}^\textcolor{limegreen}{2} = \textcolor{red}{16} Level 6-7 GCSE Negative powers flip the fraction and put 1 over the number In general, the result of a negative power is “\bf{1} over that number to the positive power”, i.e. \textcolor{red}{a}^{-\textcolor{limegreen}{b}} = \dfrac{1}{\textcolor{red}{a}^\textcolor{limegreen}{b}} for any value of a or b. When the power is \textcolor{blue}{-1}, this takes the form, \textcolor{red}{a}^{\textcolor{blue}{-1}}=\dfrac{1}{\textcolor{red}{a}} or \textcolor{red}{10}^{\textcolor{blue}{-1}} = \dfrac{1}{\textcolor{red}{10}} When the number is a fraction, the negative power flips the fraction. \bigg(\dfrac{\textcolor{blue}{a}}{\textcolor{limegreen}{b}}\bigg)^{-\textcolor{red}{x}} = \bigg(\dfrac{\textcolor{limegreen}{b}}{\textcolor{blue}{a}}\bigg)^\textcolor{red}{x} Level 6-7 GCSE Level 6-7 GCSE Simplify the following, 4^{-3}. We could alternatively write the expression as \sqrt{4^3}, but in this case the first option is easier. [2 marks] So, we know that 9^{\frac{3}{2}} is equal to \sqrt[2]{9^3} or (\sqrt[2]{9})^3. (Non calculator) [3 marks] The first part of the expression is a power of 2, whilst the second part is a power of 8. We also know that 4^3=4\times 4\times 4=16\times 4=64. So this simplifies to, (\sqrt[3]{8})^5=2^5 Counting up in powers of 2: 4, 8, 16, 32 – we see that 32 is the 5th power of 2, so \sqrt[3]{8}^5=32 Therefore, the answer is, 8^{-\frac{5}{3}}=\dfrac{1}{32} Related Topics Worksheet and Example Questions Drill Questions Evaluating this final answer gives 2^3 = 8 Level 6-7 GCSE So, we can’t use any laws straight away since the terms don’t have the same base. \textcolor{red}{x}^{\large{\frac{\textcolor{limegreen}{1}}{\textcolor{blue}{2}}}}= \sqrt[\textcolor{blue}{2}]{\textcolor{red}{x}^\textcolor{limegreen}{1}} =\sqrt[\textcolor{blue}{2}]{\textcolor{red}{x}} \textcolor{red}{x}^{\large{\frac{\textcolor{limegreen}{1}}{\textcolor{blue}{3}}}}= \sqrt[\textcolor{blue}{3}]{\textcolor{red}{x}^\textcolor{limegreen}{1}} =\sqrt[\textcolor{blue}{3}]{\textcolor{red}{x}} Note: it doesn’t matter which order you carry out the square root and multiplication operations. Level 6-7 GCSE You may also be asked to simplify expressions where the numerator is not \bf{1}. So, to work out (\sqrt[2]{9})^3, we first have to square root 9, which is easy enough – the square root of 9 is 3. [2 marks] We now know that 4^{-3} is equal to \dfrac{1}{4^3}. Firstly, as 3^2=9, the inverse operation gives, \sqrt{9}=3 So, that leaves 6^{-2}, this becomes the following fraction, 6^{-2}=\dfrac{1}{6^2} We know that 6^2=6\times 6=36, so 6^{-2}=\dfrac{1}{36} Multiplying our two answers together, we get \sqrt{9}\times 6^{-2}=3\times\dfrac{1}{36}=\dfrac{3}{36}=\dfrac{1}{12} This expression can be rewritten as, \sqrt4 \times (\sqrt4)^3 Given we know that \sqrt4=2 , this becomes, 2\times2^3 Hence, 2\times2^3=2\times8=16 Notice that in this example we chose to perform the \sqrt{4} operation before cubing the answer. As it is a negative power we can rewrite this as, 8^{-\frac{5}{3}}=\frac{1}{8^{\frac{5}{3}}} Now, we can work out the denominator, which we will write as, 8^{\frac{5}{3}}=\sqrt[3]{8^5}=(\sqrt[3]{8})^5 We know that \sqrt[3]{8}=2. However, if we recognise that 9=3^2, then we can write the first term as \left(3^2\right)^5 Using the power law, we get \left(3^2\right)^5=3^{2\times5}=3^{10} Therefore, the whole expression becomes 3^{10}\times3^{-5} Applying the multiplication law, this simplifies to 3^{10+(-5)}=3^5 Thus, we have written the expression as a power of 3. Level 6-7 GCSE Simplify the following, 9^{\frac{3}{2}}. 2^{15}\times2^{-12}=2^{15+(-12)}=2^3 Thus, we have written the expression as a power of 2. \textcolor{red}{a}^{\large{\frac{\textcolor{blue}{b}}{\textcolor{limegreen}{c}}}} = \sqrt[\textcolor{limegreen}{c}]{\textcolor{red}{a}^\textcolor{blue}{b}} This is commonly use to show square and cube roots. So, we get that 4^{-3}=\frac{1}{64}. So, (\sqrt[2]{9})^3 becomes 3^3, which is 3^3=3\times 3\times 3 = 27 Level 6-7 GCSE Write 2^{15}\times 8^{-4} as a power of 2, and hence evaluate the expression. September 2, 2019 corbettmaths GCSE 6 - 7AQAEdexcelOCRWJEC Level 6-7 GCSE The fractional indices laws apply when the power is a fraction.

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