Topic test | Linear equations and inequalities

Linear models and inequalities applications test

Name: _____ Date: _____

16 questions | 47 marks | 60 minutes

Build, solve and evaluate models for prices, counts, budgets and capacity.

No calculator needed.

1. A room hire costs 18 dollars plus 6 dollars per hour. The final charge is 54 dollars. Find the number of hours. [2 marks]

2. A number is tripled and reduced by 4. The result is 17. Find the number. [2 marks]

3. A delivery company charges 12 dollars plus 3 dollars per kilometre. Another charges 20 dollars plus 2 dollars per kilometre. Find the distance at which their prices match. [3 marks]

4. At a market, 2 apples and 3 pears cost 13 dollars, while 1 apple and 1 pear cost 5 dollars. Find the prices. [3 marks]

5. A school sells 30 tickets at either 8 dollars or 5 dollars. The total is 192 dollars. Find how many of each price were sold. [3 marks]

6. Two parking models are $C = 3h + 4$ and $C = 3h + 7$. Explain whether they have a break-even duration. [2 marks]

7. A teacher models a score using $S = 2p + 6$ and also $2S = 4p + 12$. Do these equations determine one value of p? Explain. [3 marks]

8. A club has 90 dollars and spends 15 dollars on equipment. Each entry costs 6 dollars. Find the maximum whole number of entries it can buy. [3 marks]

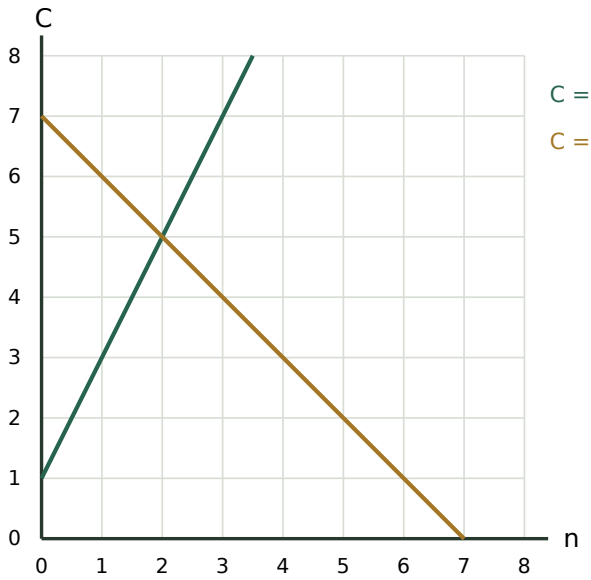
9. A refrigerated box must stay below 5 degrees Celsius. Its temperature is modelled by $T = 17 - 2t$, where t is in minutes. Solve the condition on t. [3 marks]

10. A bus has 40 seats. Let a and c count adults and children. Write a capacity inequality and state the variable domains. [2 marks]

11. A stall can spend at most 60 dollars on notebooks costing 4 dollars and pens costing 2 dollars. Let n, p be their counts. Write the budget constraint and test buying 10 notebooks and 12 pens. [3 marks]

12. A business must make at least 5 products. Product A takes 2 hours and B takes 3 hours; at most 18 hours are available. Write the inequalities. [3 marks]

13. The graph shows two cost models, $C = 2n + 1$ and $C = 7 - n$, for the limited input range shown. Use the graph and algebra to find their equal value. [3 marks]



Compare the two cost models

14. A word problem produces a solution of -3 adult tickets and 15 child tickets. Explain what this tells you and one thing to check before accepting the model. [3 marks]

15. A plan must satisfy $x + y \geq 8$ and $3x + 2y \leq 20$, with nonnegative whole-number counts. Test plans $(4, 4)$ and $(5, 3)$. [4 marks]

16. A council hires 12 vehicles, each a 4-seat car or a 7-seat van. [5 marks]

(a) There are exactly 66 seats. Find the number of each vehicle. [3 marks]

(b) Could there instead be exactly 67 seats using 12 vehicles of these types? Explain. [2 marks]