Algebra 2 Unit 1 worksheet: Linear functions in context

Name _____ Date _____ Period _____

1. Each rule describes a situation. For each one, name the input and the output with their units, say what the rate of change and the starting value mean in the situation (with units), and write the statement after it as a sentence.

(a) $D(t) = 640 - 80t$ is the distance, in km, a family still has to drive to reach a city t hours after leaving home. Statement: $D(5) = 240$.

(b) $C(k) = 0.12k + 45$ is the cost, in dollars, of having k kilograms of gravel delivered. Statement: $C(800) = 141$.

(c) $S(y) = 2400y + 38000$ is a nurse's yearly salary, in dollars, y years after she started her job. Statement: $S(4) = 47600$.

2. Mia has 600 dollars on her bus pass card. Each week she tops it up with 120 dollars from her weekend job and spends 10 dollars of it on bus fares.

(a) Write the amount $M(n)$, in dollars, on the card after n weeks, and say what each number in your rule means, with its units.

(b) Find $M(10)$ and say what it means.

(c) After how many weeks will she have 1920 dollars?

3. Mei has 340 dollars saved and adds 25 dollars every week. Kofi has 115 dollars saved and adds the same amount every week, more than Mei does. After exactly 9 weeks they have the same amount.

(a) How much does Kofi add each week? Write each person's savings, $M(w)$ and $K(w)$ in dollars, after w weeks.

(b) How far ahead of Mei is Kofi after 20 weeks?

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4. A spring hangs from a hook, and its length depends on the mass hung from it. With 1 kg hanging, the spring is 18 cm long; with 4 kg hanging, it is 36 cm long. Assume the length $L(x)$, in cm, with x kg hanging is a linear function of x.

(a) Write $L(x)$ and say what both of its numbers mean, with their units.

(b) What mass stretches the spring to 66 cm?

5. An online shop charges for an order of photo prints by the number of prints, n. Its price $C(n)$, in dollars, is a linear function of n. Ryan copied these prices from the shop's website, but he copied one of them wrong.

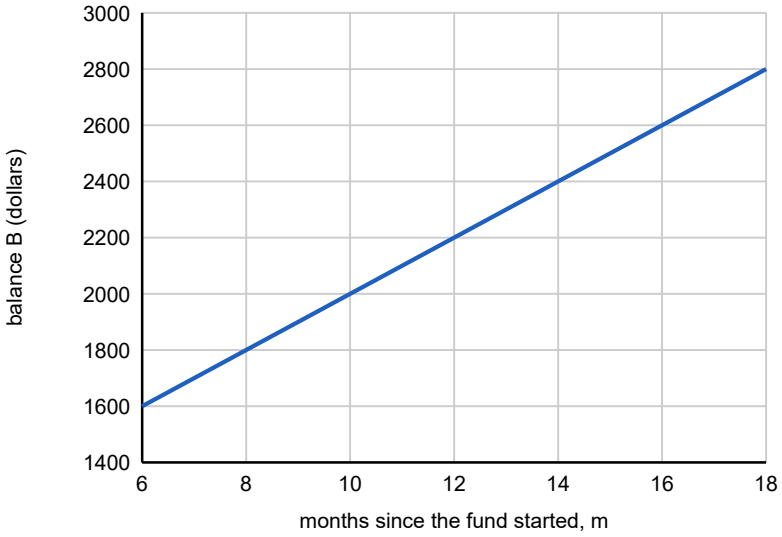
n **(prints)**	10	25	40	70	100
$C(n)$ (dollars)	6.30	9.00	11.70	17.40	22.50

(a) Find the wrong price and give the right one.

(b) Write $C(n)$ and say what both of its numbers mean, with their units.

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6. Grace is saving for a used car. She started a car fund and puts in the same amount every month. The graph shows the balance $B(m)$ of the fund, in dollars, m months after she started it, from month 6 to month 18. Notice where each axis starts.



(a) Find the rate of change of B, with its units, and say what it means.

(b) Find the starting value $B(0)$ and say what it means. Why is it not the number where the line meets the left edge of the graph?

(c) Write $B(m)$ and find when the balance reaches 4000 dollars, if she keeps saving the same way.

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7. A school club sells T-shirts. Its profit, in dollars, from selling n shirts is $P(n) = 7n - 210$.

(a) Say what 7 and -210 mean, and find the fewest shirts the club must sell to avoid a loss.

(b) The printer raises the cost of the order by 60 dollars, and nothing else changes. Write the new profit $P_1(n)$, say how its graph differs from the graph of P, and find the fewest shirts that now avoid a loss.

(c) Instead, the club raises its price by 3 dollars a shirt, and nothing else changes. Write the new profit $P_2(n)$, say how its graph differs from the graph of P, and find the fewest shirts that now avoid a loss.

(d) For each change, by how much does the profit on n shirts differ from $P(n)$? Use this to say which change matters more for a club that sells 100 shirts.

8. A bakery charges $C(n) = 2.5n + 6$ dollars for an order of n cupcakes. Liam says: "If I order twice as many cupcakes, I pay twice as much." Show with an example that Liam is wrong. Then say which part of the price does double, and why the rest does not.

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