

Name _____

Date _____

10.3 Percentage increase and decrease — worked answers

Increase and decrease a quantity by a percentage, and express a change as a percentage of the original. · 52 questions

A · Fluency — Increase, decrease and express as a percentage.

- 1 Increase **200** by **10%**.
Answer: 220
10% of 200 is 20, and $200 + 20 = 220$.
- 2 Decrease **200** by **10%**.
Answer: 180
10% of 200 is 20, and $200 - 20 = 180$.
- 3 Increase **150** by **20%**.
Answer: 180
20% of 150 is 30, and $150 + 30 = 180$.
- 4 Decrease **150** by **20%**.
Answer: 120
20% of 150 is 30, and $150 - 30 = 120$.
- 5 Increase **80** by **25%**.
Answer: 100
25% of 80 is 20, and $80 + 20 = 100$.
- 6 Decrease **80** by **25%**.
Answer: 60
25% of 80 is 20, and $80 - 20 = 60$.
- 7 Increase **340** by **5%**.
Answer: 357
5% of 340 is 17, and $340 + 17 = 357$.
- 8 Decrease **340** by **5%**.
Answer: 323
5% of 340 is 17, and $340 - 17 = 323$.
- 9 Increase **96** by **50%**.
Answer: 144
50% of 96 is 48, and $96 + 48 = 144$.

- 10** Decrease **96** by **50%**.

Answer: 48

50% of 96 is 48, and $96 - 48 = 48$.

- 11** Increase **400** by **15%**.

Answer: 460

15% of 400 is 60, and $400 + 60 = 460$.

- 12** Decrease **400** by **15%**.

Answer: 340

15% of 400 is 60, and $400 - 60 = 340$.

- 13** What is **15** as a percentage of **20**?

Answer: 75

$15 \div 20 = 0.75$, and $\times 100$ gives 75%.

- 14** What is **9** as a percentage of **12**?

Answer: 75

$9 \div 12 = 0.75$, and $\times 100$ gives 75%.

- 15** What is **18** as a percentage of **24**?

Answer: 75

$18 \div 24 = 0.75$, and $\times 100$ gives 75%.

- 16** What is **7** as a percentage of **10**?

Answer: 70

$7 \div 10 = 0.7$, and $\times 100$ gives 70%.

- 17** What is **30** as a percentage of **40**?

Answer: 75

$30 \div 40 = 0.75$, and $\times 100$ gives 75%.

- 18** What is **12** as a percentage of **50**?

Answer: 24

$12 \div 50 = 0.24$, and $\times 100$ gives 24%.

- 19** What is **21** as a percentage of **30**?

Answer: 70

$21 \div 30 = 0.7$, and $\times 100$ gives 70%.

- 20** What is **36** as a percentage of **48**?

Answer: 75

$36 \div 48 = 0.75$, and $\times 100$ gives 75%.

- 21** What is **16** as a percentage of **80**?

Answer: 20

$16 \div 80 = 0.2$, and $\times 100$ gives 20%.

- 22** What is **45** as a percentage of **60**?

Answer: 75

$45 \div 60 = 0.75$, and $\times 100$ gives 75%.

- 23** A price changes from **40** to **50**. What is the percentage increase? Give the number only.

Answer: 25

The change is 10. As a percentage of the **original** 40: $10 \div 40 \times 100 = 25\%$.

- 24** A price changes from **80** to **60**. What is the percentage decrease? Give the number only.

Answer: 25

The change is 20. As a percentage of the **original** 80: $20 \div 80 \times 100 = 25\%$.

- 25** A price changes from **25** to **30**. What is the percentage increase? Give the number only.

Answer: 20

The change is 5. As a percentage of the **original** 25: $5 \div 25 \times 100 = 20\%$.

- 26** A price changes from **200** to **150**. What is the percentage decrease? Give the number only.

Answer: 25

The change is 50. As a percentage of the **original** 200: $50 \div 200 \times 100 = 25\%$.

- 27** A price changes from **60** to **75**. What is the percentage increase? Give the number only.

Answer: 25

The change is 15. As a percentage of the **original** 60: $15 \div 60 \times 100 = 25\%$.

- 28** A price changes from **120** to **90**. What is the percentage decrease? Give the number only.

Answer: 25

The change is 30. As a percentage of the **original** 120: $30 \div 120 \times 100 = 25\%$.

B · Reasoning — Which amount you divide by, and why.

- 29** To increase an amount by 20%, you can ...

- ☐ multiply by 20
- ☐ find 20% and add it on
- ☐ multiply by 0.2
- ☐ divide by 20

Answer: find 20% and add it on

Or, in one step, multiply by 1.2 — the same thing.

- 30** To decrease an amount by 20%, you can ...

- ☐ find 20% and subtract it
- ☐ multiply by 20
- ☐ divide by 20
- ☐ add 80%

Answer: find 20% and subtract it

Or multiply by 0.8, since $100\% - 20\% = 80\%$.

- 31** When you work out a percentage change, what do you divide by?

- ☐ The new amount
- ☐ The original amount
- ☐ 100
- ☐ The change

Answer: The original amount

Percentage change is always measured against where you started.

32 A price rises from 40 to 50. Why is that a 25% increase and not a 20% one?

- ☐ It is 20%
- ☐ The rise of 10 is compared with the original 40, not the new 50
- ☐ Because $50 - 40 = 10$
- ☐ Because 25 is halfway

Answer: The rise of 10 is compared with the original 40, not the new 50

$10 \div 40 = 25\%$. Dividing by 50 would give 20%, which answers a different question.

33 If a price goes up 10% then down 10%, do you get back to the start?

- ☐ Yes
- ☐ No

Answer: No

Starting at 100: up 10% gives 110, then 10% of 110 is 11, leaving 99. The two percentages are taken of different amounts.

34 Increasing by 100% means the amount ...

- ☐ stays the same
- ☐ doubles
- ☐ trebles
- ☐ halves

Answer: doubles

You add another whole lot of it.

35 Decreasing by 100% leaves you with ...

- ☐ the same
- ☐ half
- ☐ nothing
- ☐ double

Answer: nothing

You have taken away all of it.

36 What must you always state alongside a percentage change?

- ☐ The date
- ☐ Whether it is an increase or a decrease
- ☐ The units
- ☐ Nothing

Answer: Whether it is an increase or a decrease

"25%" on its own does not say which direction.

C · Challenge — Two changes in a row.

37 A price of \$250 rises by 12%. What is the new price, in dollars?

Answer: 280

12% of 250 = 30, and $250 + 30 = 280$.

38 A price of \$250 falls by 12%. What is the new price, in dollars?

Answer: 220

$250 - 30 = 220$.

39 A price rises from 80 to 100. What is the percentage increase?

Answer: 25

The rise is 20, and $20 \div 80 \times 100 = 25\%$.

- 40** A price falls from 100 to 80. What is the percentage decrease?

Answer: 20

The fall is 20, and $20 \div 100 \times 100 = 20\%$. Note it is not the same as the previous answer — the starting amounts differ.

- 41** A price goes up 10% then down 10%, starting at 200. What is the final price, in dollars?

Answer: 198

$200 \rightarrow 220 \rightarrow 220 - 22 = 198$. You do not get back to 200.

- 42** A shop increases a price by 20% then offers 20% off. Starting at 50, what is the final price, in dollars?

Answer: 48

$50 \rightarrow 60 \rightarrow 60 - 12 = 48$.

D · Word problems — Sales, salaries and populations.

- 43** A jacket costing \$90 is reduced by 30%. What is the sale price, in dollars?

Answer: 63

30% of 90 = 27, and $90 - 27 = 63$.

- 44** A salary of \$30 000 rises by 4%. What is the new salary, in dollars?

Answer: 31200

4% of 30 000 = 1200.

- 45** A class of 25 grows to 30. What is the percentage increase?

Answer: 20

The rise is 5, and $5 \div 25 \times 100 = 20\%$.

- 46** A journey of 50 minutes is cut to 40 minutes. What is the percentage decrease?

Answer: 20

$10 \div 50 \times 100 = 20\%$.

- 47** A learner scores 18 out of 25. What percentage is that?

Answer: 72

$18 \div 25 \times 100 = 72\%$.

- 48** A shop sells 240 of 300 tickets. What percentage is sold?

Answer: 80

$240 \div 300 \times 100 = 80\%$.

- 49** A bike costing \$200 is reduced by 15%. What is the sale price, in dollars?

Answer: 170

15% of 200 = 30, and $200 - 30 = 170$.

- 50** A town of 8000 grows by 2.5%. What is the new population?

Answer: 8200

2.5% of 8000 = 200.

- 51** A phone bill falls from \$60 to \$45. What is the percentage decrease?

Answer: 25

$15 \div 60 \times 100 = 25\%$.

- 52** A recipe for 4 is increased by 50% to serve more. How many does it now serve?

Answer: 6

50% of 4 = 2, and $4 + 2 = 6$.