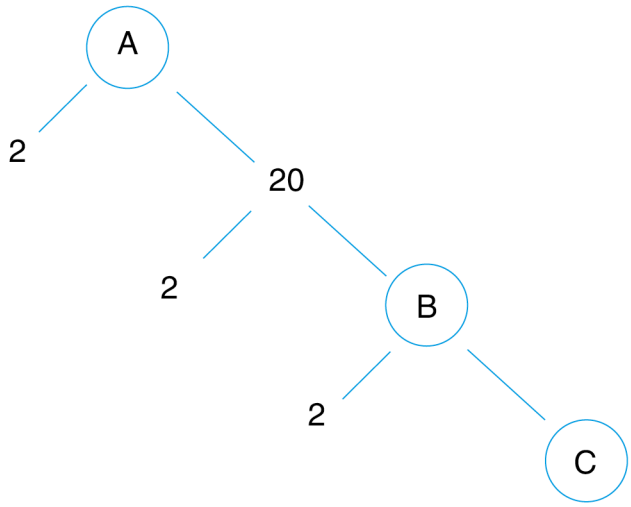
german math olympiad

# PAST PAPERS

## Grades 7-8

1-




**According to the factor tree above, what is the value of the expression A + B – C?**

A) 40 B) 45 C) 50 D) 55

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2-

**How many integers from 1 to 100 (inclusive) are multiples of 3 but not multiples of 2 or 5?**

A) 12 B) 13 C) 14 D) 15

---

3-

**A 3-digit composite number has exactly 9 positive divisors. Which could it be?**

A) 144 B) 150 C) 196 D) 294

**4-**

**A product is sold for €360 at a loss of 10% on its cost price. At what price should it be sold to make a profit of 20% on its cost price?**

A) 420 B) 480 C) 540 D) 600

---

**5-**

**Let $a = \frac{3}{7}$ and $b = \frac{5}{14}$.**

**Compute $\frac{a}{b} + \frac{b}{a}$.**

A) $\frac{29}{30}$ B) $\frac{61}{30}$ C) $\frac{87}{35}$ D) $\frac{41}{30}$

---

**6-**

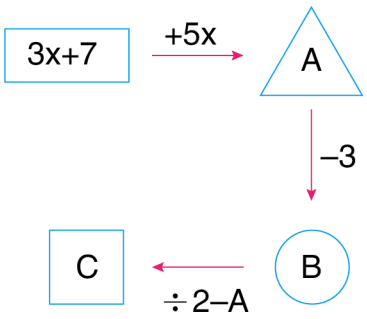
**Which option lists two values that are both equal to 0.28?**

A) 28% and $\frac{14}{25}$ B) 2.8% and $\frac{1}{250}$

C) 28% and $\frac{7}{25}$ D) 280% and $\frac{7}{250}$

---

**7-**




**When the operations are carried out in the direction of the arrows above, which of the following should replace C in the last box?**

A) –2x + 5 B) 4x + 5 C) –4x – 5 D) 2x – 5

8-

**A number t satisfies both inequalities:**

**$4t + 5 \geq 2t + 11$ and $4t < 28$**

**What is the solution set?**

A) $t \geq 8$

B) $3 \leq t < 7$

C) $4 < t \leq 6$

D) $t > 3$

---

9-

**The solution to an inequality is shown on a number line as an open circle at 4 and shading to the right. Which inequality could represent this?**

A) $x \geq 4$

B) $x > 4$

C) $x \leq 4$

D) $x < 4$

---

10-

**The first term of an arithmetic sequence is 2, and the common difference is 3. Its 11th term is n.**

**What is the 8th term of a geometric sequence whose first term is n and whose common ratio is $\frac{1}{2}$ ?**

A) 1 B) $\frac{1}{2}$ C) $\frac{1}{4}$ D) $\frac{1}{8}$

---

11-

**If $g(x) = 2x^2$, which of the following is true?**

A) $g(2 + 3) = g(2) + g(3)$

B) $g(4)$ is twice $g(2)$

C) $g(3) = 18$

D) $g(2) = 6$

---

12-

**A function rule multiplies each input x by 2 and then adds 3.
Which equation represents this rule?**

A) $f(x) = 2x + 3$

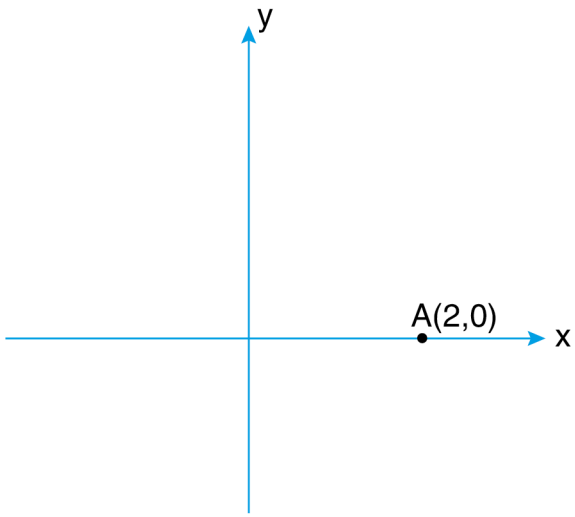
B) $f(x) = 3x + 2$

C) $f(x) = 2(x + 3)$

D) $f(x) = x + 5$

---

13-




**A line passes through A(2,0) and has slope -2.
What is the area of the region in the first quadrant bounded by this line, x=1, the x-axis, and the y-axis?**

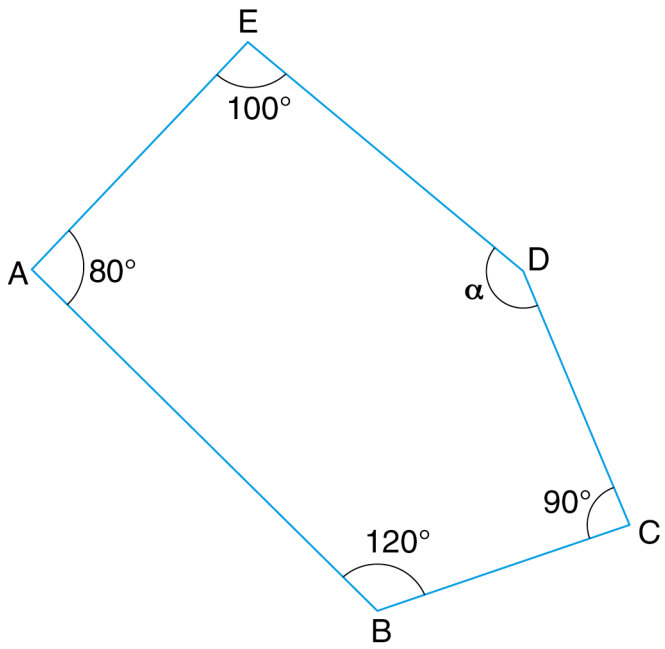
A) 1 square unit

B) 2 square units

C) 2.5 square units

D) 3 square units

14-

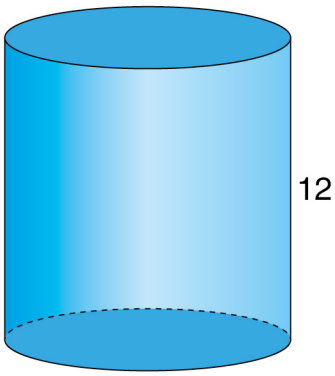



**In pentagon ABCDE, what is m∠CDE?**
**(The figure is not drawn to scale)**

A) 160°  B) 150°  C) 140°  D) 130

---

15-




**In the figure, a right circular cylinder with a height of 12 units is cut by a plane that passes through the centre of the base and is perpendicular to the base. The largest cross-section formed by this cut is a square.**
**Accordingly, what is the volume of this cylinder?**
**(The figure is not drawn to scale)**

A) 380 · π  B) 400 · π  C) 424 · π  D) 432 · π

16-

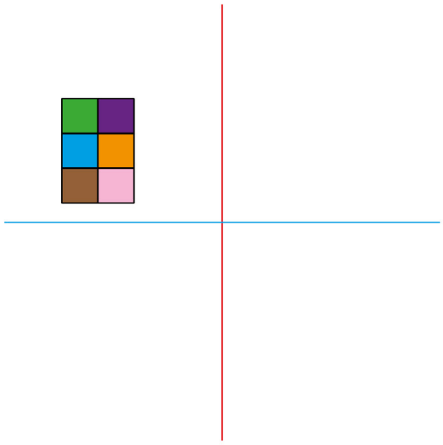
**Point A(–3, 2y + 1) is translated 2 units to the right along the x-axis and 3 units down along the y-axis, giving point B(3x – 2, 8).**

**What is the value of x·y?**

A) $\frac{5}{3}$ B) 1 C) $\frac{3}{2}$ D) 5

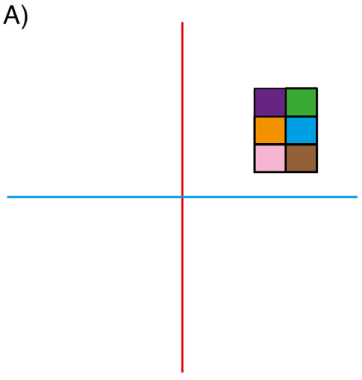
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17-

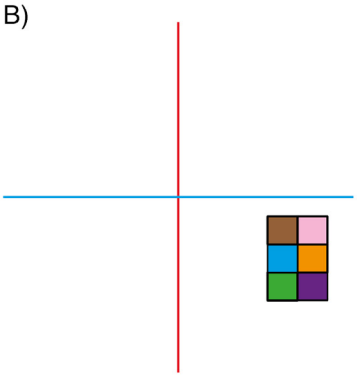


**The shape above is reflected in the red vertical line.**
**Which option shows the resulting image?**

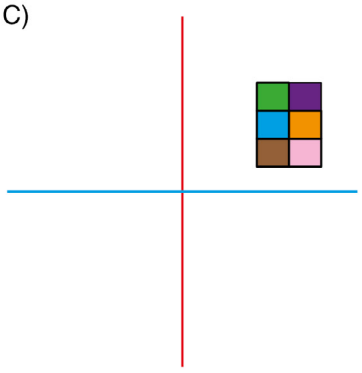
A)



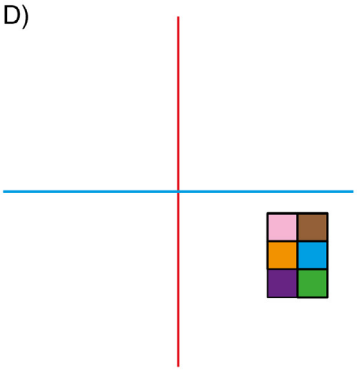
B)



C)



D)



18-

**A shape is placed on a coordinate grid with a red vertical line and a blue horizontal line. Consider these transformations:**

**I. Reflect first in the red line, then in the blue line**

**II. Reflect first in the blue line, then in the red line**

**III. Rotate 180° about the intersection of the two lines**

**Which transformations produce the same final image?**

A) I and II

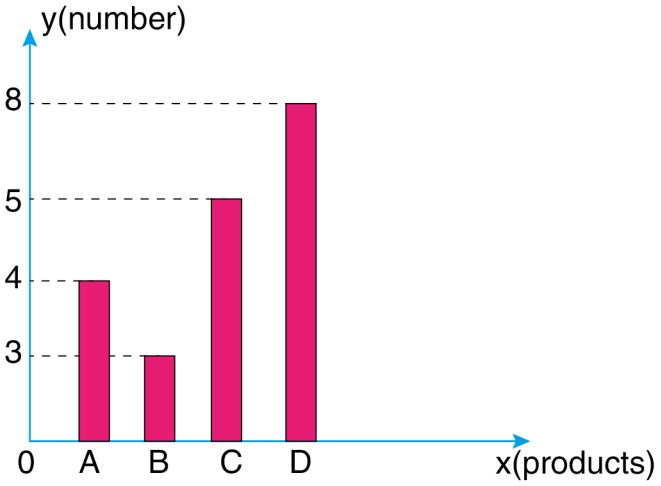
B) II and III

C) I and III

D) All of the above

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19-

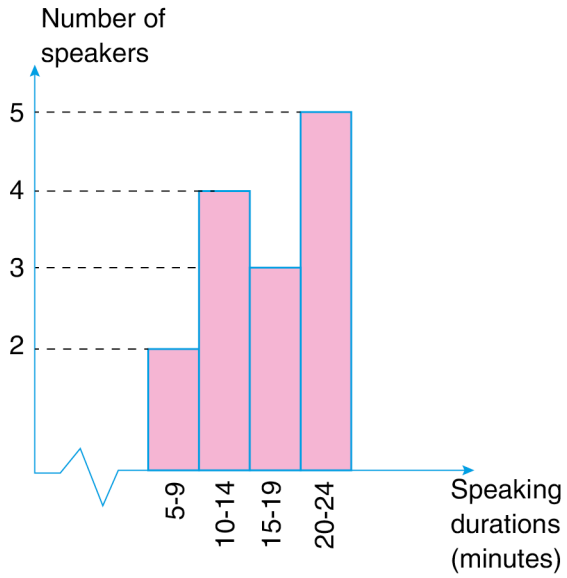



**The number of vehicles of brands A, B, C, and D produced in a factory in one week is shown above.**

**If these numbers were represented in a pie chart, by how many degrees would the central angle of D exceed that of B?**

A) 72°  B) 90°  C) 108°  D) 120°

20-




**The chart above shows the distribution of the number of speakers at a conference based on their speaking durations.**

**What is the minimum possible total speaking time of all the speakers?**

A) 180

B) 185

C) 190

D) 195

---

21-

**In a class president election with three candidates, the number of votes received by the candidates is represented by the variables x, y, and z, and it is given that:**

**$x = 3y = 6z$**

**When the results are shown in a pie chart, what is the central angle of the sector that corresponds to the candidate who received y votes?**

A) 80

B) 70

C) 60

D) 50

22-

**The positive divisors of 36 are written on separate balls and placed into a bag.**
**If two balls are drawn at random, what is the probability that the sum of the numbers on them is odd?**

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{3}{5}$ D) $\frac{4}{9}$

---

23-



**In a classroom, there are 10 girls, 4 of whom have blue eyes, and 12 boys, 3 of whom have blue eyes.**

**If a randomly chosen student is known to have blue eyes, what is the probability that this student is a girl?**

A) $\frac{2}{7}$ B) $\frac{3}{7}$ C) $\frac{4}{7}$ D) $\frac{2}{3}$

---

24-

**A locker code uses 3 different digits chosen from {1,2,3,4,5}. Digits cannot repeat and order matters.**

**How many different codes are possible?**

A) 10 B) 20 C) 30 D) 60

25-

| water(grams) | 8 | ▲ | 12 | ● |
|---|---|---|---|---|
| flour(grams) | 3 | 23 | 8 | 18 |

**The linear relationship between the amounts of water and flour in a mixture is shown in the table above.**

**According to the table, what is the result of the operation "▲+●"?**

A) 44 B) 42 C) 40 D) 38

---

26-

**Statement 1: All metals conduct electricity.**

**Statement 2: Copper is a metal.**

**Which conclusion follows by deduction?**

A) Some metals do not conduct electricity.

B) All conductors are metals.

C) Copper does not conduct electricity.

D) Copper conducts electricity.

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27-

**A survey of 180 students shows: 90 play football, 60 play basketball, 30 play both.**

**A student claims:** "Most students play neither."

**Which is the best response?**

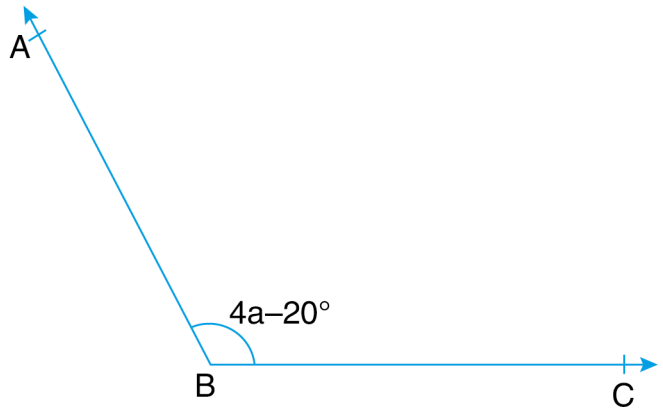
A) Agree, because 90 is less than 180.

B) Agree, because 30 play both.

C) Disagree, because 90+60=150.

D) Disagree, because 90+60−30=120 do at least one.

28-




**The angle ABC given above is an obtuse angle.**
**Given that "a" is an integer, how many different integer values can angle A take?**

A) 21 B) 22 C) 23 D) 24

---

29-

**A school uses 350 L of water per day per classroom. There are 28 classrooms and 190 school days per year. Which expression best estimates the annual water use?**

A) 350×28×190

B) 350+28+190

C) 350×(28+190)

D) 350×28+190

---

30-

**The distance–time graph of a cyclist shows a straight line from (0, 0) to (20, 6), then a flat line from (20, 6) to (30, 6). Which statement is true?**

A) The cyclist's speed decreases between 0 and 20 min

B) The cyclist travels faster between 20 and 30 min

C) The cyclist rests between 20 and 30 min

D) The cyclist returns to the start between 20 and 30 min

## Answer Key

| | |
|---|---|
| 1 | B |
| 2 | C |
| 3 | C |
| 4 | B |
| 5 | B |
| 6 | C |
| 7 | C |
| 8 | B |
| 9 | B |
| 10 | C |
| 11 | C |
| 12 | A |
| 13 | D |
| 14 | B |
| 15 | D |
| 16 | A |
| 17 | A |
| 18 | D |
| 19 | B |
| 20 | D |
| 21 | A |
| 22 | A |
| 23 | C |
| 24 | D |
| 25 | A |
| 26 | D |
| 27 | D |
| 28 | B |
| 29 | A |
| 30 | C |