

## Prověřka "elektrostatika1" - řešení

**R5.6**  $Q = 1 \text{ } \mu\text{C} = 10^{-6} \text{ C}$ ,  $e = 1,6 \cdot 10^{-19} \text{ C}$ ;  $n = ?$

$$n = \frac{Q}{e} = 6,2 \cdot 10^{12}$$

**R5.7**  $Q = -80 \text{ } \mu\text{C} = -8,0 \cdot 10^{-5} \text{ C}$ ,  $e = -1,6 \cdot 10^{-19} \text{ C}$ ;  $n = ?$

$$n = \frac{Q}{e} = 5 \cdot 10^{14}$$

**R5.8** a)  $r_1 = 2r$ , b)  $r_2 = 3r$ ;  $F = ?$

$$F \sim \frac{1}{r^2}, \quad F_1 = \frac{F}{4}, \quad F_2 = \frac{F}{9}$$

**R5.9**  $F = 1 \text{ N}$ , a)  $r_1 = r/2$ , b)  $r_2 = r/3$ ;  $F = ?$

$$F \sim \frac{1}{r^2}$$

a)  $F_1 = 4 \text{ N}$

b)  $F_2 = 9 \text{ N}$

**R5.10**  $r = 10 \text{ cm} = 0,1 \text{ m}$ ,  $Q_1 = Q_2 = 1 \text{ } \mu\text{C} = 10^{-6} \text{ C}$ ;  $F = ?$

$$F = k \frac{Q_1 Q_2}{r^2} = 0,9 \text{ N}$$

**R5.11**  $Q_1 = Q_2 = 10 \text{ } \mu\text{C} = 10^{-5} \text{ C}$ ,  $F = 10 \text{ N}$ ;  $r = ?$

$$r = \sqrt{\frac{k Q_1 Q_2}{F}} = 3 \cdot 10^{-1} \text{ m} = 30 \text{ cm}$$

**R5.13**  $r = 10^{-14} \text{ m}$ ,  $Q_p = 1,6 \cdot 10^{-19} \text{ C}$ ;  $F = ?$

$$F = k \frac{Q_p^2}{r^2} = 2,3 \text{ N}$$

**R5.14**  $Q_1 = 1 \text{ } \mu\text{F} = 10^{-6} \text{ C}$ ,  $r = 3 \text{ cm} = 3 \cdot 10^{-2} \text{ m}$ ,  $F = 1 \text{ N}$ , a)  $\epsilon_r = 1$ , b)  $\epsilon_r = 2$ ;  $Q_2 = ?$

a)  $Q_2 = \frac{F r^2}{k Q_1} = 10^{-7} \text{ C} = 0,1 \text{ } \mu\text{C}$

b)  $Q_2' = \frac{\epsilon_r F r^2}{k Q_1} = \epsilon_r Q_2 = 2 \cdot 10^{-7} \text{ C} = 0,2 \text{ } \mu\text{C}$

**R5.15**  $Q_1 = 6 \text{ } \mu\text{C} = 6 \cdot 10^{-6} \text{ C}$ ,  $Q_2 = -4 \text{ } \mu\text{C} = -4 \cdot 10^{-6} \text{ C}$ ,  $r = 6 \text{ cm} = 6 \cdot 10^{-2} \text{ m}$ ; a)  $F = ?$ , b)  $F' = ?$ ,  $Q' = ?$

a)  $F = k \frac{Q_1 Q_2}{r^2} = 60 \text{ N}$

b)  $Q' = \frac{Q_1 + Q_2}{2} = 10^{-6} \text{ C} = 1 \text{ } \mu\text{C}$

$$F' = k \frac{Q'^2}{r^2} = 2,5 \text{ N}$$

**R5.16**  $Q = 20 \text{ } \mu\text{C} = 2 \cdot 10^{-5} \text{ C}$ ,  $F = 1 \text{ N}$ ;  $E = ?$

$$E = \frac{F}{Q} = 5 \cdot 10^4 \text{ N} \cdot \text{C}^{-1}$$

**R5.17**  $E = 4 \cdot 10^5 \text{ N} \cdot \text{C}^{-1}$ ,  $Q = 25 \text{ } \mu\text{C} = 2,5 \cdot 10^{-5} \text{ C}$ ;  $F = ?$

$$F = QE = 10 \text{ N}$$