

Indywidualny identyfikator uczestnika konkursu

WOJEWÓDZKI KONKURS PRZEDMIOTOWY   
Z FIZYKI

organizowany przez Łódzkiego Kuratora Oświaty   
dla uczniów szkół podstawowych w roku szkolnym 2021/2022

TEST – ETAP REJONOWY

* Na wypełnienie testu masz **90 min**.
* Arkusz liczy **15 stron** i zawiera **30 zadań,** w tym brudnopis.
* Przed rozpoczęciem pracy sprawdź, czy Twój arkusz jest kompletny. Jeżeli zauważysz usterki, zgłoś je Komisji Konkursowej.
* Zadania czytaj uważnie i ze zrozumieniem.
* Odpowiedzi wpisuj długopisem bądź piórem, kolorem czarnym lub niebieskim.
* Dbaj o czytelność pisma i precyzję odpowiedzi.
* W zadaniach zamkniętych zaznacz prawidłową odpowiedź, wstawiając znak X we właściwym miejscu.
* Jeżeli się pomylisz, błędne zaznaczenie otocz kółkiem i zaznacz znakiem X inną odpowiedź.
* Oceniane będą tylko te odpowiedzi, które umieścisz w miejscu do tego przeznaczonym.
* Do każdego numeru zadania podana jest maksymalna liczba punktów możliwa do uzyskania za prawidłową odpowiedź.
* Pracuj samodzielnie. Postaraj się udzielić odpowiedzi na wszystkie pytania.
* Nie używaj korektora. Jeśli pomylisz się w zadaniach otwartych, przekreśl błędną odpowiedź   
  i wpisz poprawną.
* Korzystaj tylko z przyborów i materiałów określonych w regulaminie konkursu.

***Powodzenia***

Maksymalna liczba punktów - 100

Liczba uzyskanych punktów - …..

Imię i nazwisko ucznia: …………………………………………..……………

wypełnia Komisja Konkursowa po zakończeniu sprawdzenia prac

Podpisy członków komisji sprawdzających prace:

1. ………………………………………………….. ……………….……………

(imię i nazwisko) (podpis)

1. ………………………………………………….. ……………….……………

(imię i nazwisko) (podpis)

# Zadanie nr 1

Oblicz średnią szybkość turysty w czasie 6h jego wycieczki na podstawie wykresu jego szybkości.

0 1 2 3 4 5 6 t(h)

v(km/h)

5

1

* 1. 2 km/h
  2. 3 km/h
  3. 4 km/h
  4. 6 km/h

**……………….../1 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 2

Wykres przedstawia zależność szybkości od czasu dla pewnego rowerzysty.

W kolejnych zdaniach opisujących wykres zaznacz P - jeśli zdanie jest prawdziwe lub F - jeśli jest fałszywe.



|  |  |  |
| --- | --- | --- |
| 1. Rowerzysta po 6 s ruchu znalazł się w punkcie startu | P | F |
| 1. W czasie 6 s ruchu rowerzysta pokonał drogę równą 30 m | P | F |
| 1. Maksymalna szybkość rowerzysty wyniosła 36 km/h | P | F |
| 1. Średnia szybkość rowerzysty w czasie 6 s wynosiła 5 m/s | P | F |
| 1. W końcu szóstej sekundy ruchu rowerzysta się zatrzymał | P | F |
| 1. Przyspieszenie rowerzysty w pierwszych 2 s ruchu wynosiło 10 m/s2 | P | F |

**……………….../6 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

Poniższy wykres, przedstawiający zależność położenia od czasu dla ciała poruszającego się wzdłuż osi x, odnosi się do trzech kolejnych zadań 3, 4 i 5.

**x (m)**

**6**

**4**

**2**

**0**

**-2**

**1 2 3 4 5 6 7 8 9 t(s)**

# Zadanie nr 3

Odczytaj z wykresu chwilę czasu, w której ciało znalazło się najdalej od punktu startu.

1. 9 s
2. 6 s
3. 5 s
4. 3 s

**……………….../1 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 4

Podczas ruchu tego ciała jego szybkość była równa zeru:

1. w chwili t = 0 s
2. w chwili t = 5 s
3. w chwilach: od t = 6 s do t = 9 s
4. w żadnej chwili

**……………….../1 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 5

Szybkość o największej wartości miało ciało w chwili:

1. 1 s
2. 4 s
3. 7 s
4. 9 s

**……………….../1 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 6

Nieruchome ciało ruszyło z przyspieszeniem 3m/s2 i poruszało się tak przez 4 s. Oblicz wartość średniej prędkości ciała w tym ruchu.

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**……………….../5 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 7

Dwie siły działają na ciało w poziomie. Jeśli ich zwroty są takie same, to wartość siły wypadkowej wynosi 50 N. Jeśli ich zwroty są przeciwne, to wartość siły wypadkowej wynosi 20 N. Oblicz wartości obu sił.

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**……………….../4 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 8

Oblicz głębokość studni, jeśli podczas wyciągania ruchem jednostajnym wiadra z wodą o masie 10 kg została wykonana praca W=950 J. Do obliczeń przyjmij przyspieszenie ziemskie g= 10 m/s2.

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**……………….../3 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 9

Wykres przedstawia zależność energii potencjalnej od wysokości dla piłki spadającej z wysokości 3m. Oblicz szybkość piłki na wysokości 0,5 m. Pomiń opory ruchu. Do obliczeń przyjmij g = 10 m/s2.

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**……………….../6 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 10

Piłkę lekarską o masie m = 2 kg wyrzucono pionowo w górę z prędkością v0 = 6 m/s.

Oblicz wysokość, na której prędkość piłki wynosi 5 m/s.

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**……………….../4 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 11

Pęd rowerzysty wynosił 180 kg m/s. Rowerzysta poruszał się ze stałą szybkością 3 m/s. Oblicz energię kinetyczną tego rowerzysty.

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**……………….../4 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 12

Oblicz moc urządzenia, które w czasie 0,5 h wykonało pracę 15120 kJ. Wynik podaj w kW.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 13

Kostka masła ma wymiary 7cm x 9,5 cm x 2,8 cm. Masa masła wynosi 200 g. Oblicz gęstość masła.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 14

Masz do dyspozycji: wagę kuchenną, szklankę w kształcie walca, linijkę i cukier. Napisz, w jaki sposób wyznaczysz gęstość cukru. Zapisz kolejne czynności i obliczenia.

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**……………….../6 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 15

Wybierz prawidłowo zapisaną w jednostkach podstawowych układu SI jednostkę ciśnienia 1 Pa.

**……………….../1 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 16

Drewniany klocek ma wymiary 30 cm x 15 cm x 5 cm. Klocek wywiera na podłoże największe ciśnienie, gdy leży na boku o wymiarach:

1. 30 cm x 15 cm
2. 15 cm x 5 cm
3. 5 cm x 30 cm
4. Klocek niezależnie od tego, na którym boku leży, wywiera na podłoże takie samo ciśnienie

**……………….../1 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 17

Pewna kobieta posiada 3 pary letnich butów różniące się powierzchnią obcasów. Są to szpilki o powierzchni obcasa 0,7 cm2, sandałki na słupku o powierzchni 6 cm2 oraz klapki o powierzchni obcasa 25 cm2. Ustal, w których butach powinna chodzić kobieta w upalny letni dzień, aby idąc asfaltowym chodnikiem pozostawiała na nim najpłytsze ślady. Odpowiedź uzasadnij.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 18

Rysunek przedstawia pięć stykających się ciał o temperaturach: 20oC, 40oC, 60oC, 80oC oraz 100oC. Strzałki na rysunku symbolizują przepływ energii cieplnej między ciałami. Ustal temperatury wszystkich ciał. Wpisz na rysunku temperatury ciał.



**……………….../4 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 19

W czasie upalnego dnia chodzisz na plaży boso i odczuwasz, że piasek jest gorący, znaleziony na plaży metalowy przedmiot parzy cię, a woda w morzu jest chłodna. Wyjaśnij dlaczego temperatury tych ciał są różne?

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 20

Do zmiany temperatury wody o 52oC zużyto 10,92 kJ ciepła. Oblicz masę wody. Do obliczeń przyjmij ciepło właściwe wody 4,2 kJ/kgK.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 21

Wykres przedstawia zależność temperatury od czasu ogrzewania ciała o masie 0,4 kg. Oblicz ciepło właściwe tego ciała przyjmując, że w każdej minucie tego procesu dostarczane jest 2 kJ ciepła. Wynik podaj w .

T (oC)

200

100

0

5 10 t(min)

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**……………….../5 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 22

Po każdym zdaniu wpisz nazwę jednego zjawiska (parowanie, topnienie, skraplanie, krzepnięcie, sublimacja, resublimacja).

1. Po wyjęciu z lodówki na powierzchni butelki z wodą mineralną pojawiły się kropelki wody - ............................
2. W pogodny dzień rozwieszone pranie szybko wysycha - ............................
3. W upalny dzień szybko znika lód wrzucony do szklanki z wodą mineralną. - ................................
4. W mroźny dzień ubyło śniegu na trawniku - ……………………

**……………….../4 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 23

Do szklanki z wodą włożono plastikową kostkę. Kostka pływa po powierzchni wody tak, że 1/3 jej objętości wystaje ponad powierzchnię wody. Narysuj, zachowując odpowiednie proporcje, siły działające na kostkę i nazwij je. Oblicz gęstość plastiku. Do obliczeń przyjmij gęstość wody 1000 kg/m3.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 24

Na siłomierzu zawieszono stalowy ciężarek. Ciężarek zanurzono w naczyniu z wodą tak, że nie dotyka on dna naczynia. Wybierz prawidłowy opis zachowania się wskazówki siłomierza.

1. Wskazówka wskaże większą wartość siły, ponieważ ciężarek oddziałuje na wodę siłą skierowaną pionowo w dół.
2. Wskazówka nie zmieni swojego położenia, ponieważ siły działające na ciężarek równoważą się.
3. Wskazówka nie zmieni swojego położenia, ponieważ siła oddziaływania ciężarka na wodę jest równa sile oddziaływania wody na ciężarek.
4. Wskazówka wskaże mniejszą wartość siły, ponieważ woda oddziałuje na ciężarek siłą skierowaną pionowo do góry.

**……………….../1 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 25

W czasie 2 s przez przewód przepłynął ładunek 10C. Oblicz natężenie prądu elektrycznego płynącego w tym przewodzie.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 26

Wykres przedstawia zależność natężenia prądu elektrycznego od przyłożonego napięcia dla dwóch przewodników o oporach R1 i R2.



Ustal, opór którego przewodnika jest większy. Odpowiedź uzasadnij.

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Na wykresie powyżej naszkicuj wykres dla przewodnika o oporze R3 mniejszym zarówno od oporu R1 jak i od R2. Zapisz jednym słowem, w jaki sposób zmienia się kąt nachylenia wykresu α, jeśli opór elektryczny przewodu maleje.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 27

Oblicz oporność przewodu, przez który w czasie 40 s pod napięciem 230 V przepływa ładunek 176 C.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 28

Do płaskiej baterii o napięciu 4,5 V przyłączono szeregowo dwa oporniki o opornościach 5Ω i 10Ω.

Narysuj schemat tego obwodu.

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Oblicz natężenie prądu płynącego przez każdy opornik.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 29

Fala morska o długości 15 m rozchodzi się z prędkością 3 m/s. Oblicz częstotliwość tej fali.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 30

Na rysunkach przedstawiono zwierciadła paraboliczne stosowane w reflektorach samochodowych. Na rysunku a) przedstawione są światła długie, a na rysunku b) – światła mijania. Napisz jaką wiązkę światła otrzymuje się, kiedy włączone są światła długie, a jaką – kiedy włączone są światła mijania?

1. b)

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