

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 WOJEWÓDZKI

* Na wypełnienie testu masz **120 min**.
* Arkusz liczy **15 stron** i zawiera **24 zadania,** 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

Pasażer postanowił zmierzyć szybkość w czasie ruchu jednostajnego samochodu. W ciągu czasu t = 3 min naliczył on n = 36 słupów. Stoper włączył w chwili mijania pierwszego słupa. Słupy są umieszczone wzdłuż drogi w odległościach co l = 100 m jeden od drugiego. Ustal, czy prędkościomierz wskazujący 80 km/h pokazywał rzeczywistą szybkość?

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 2

Na wykresie przedstawiono zależność szybkości od czasu dla jadącego samochodu. Oblicz średnią szybkość dla całego ruchu samochodu.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 3

Na rysunku przedstawiony jest wykres zależności drogi od czasu dla wody w rzece (I) oraz dla motorówki płynącej po jeziorze (II). Oblicz szybkości wody i motorówki, a następnie narysuj wykresy obrazujące szybkość motorówki względem brzegu, gdy płynie ona po rzece:

0 1 2 3 4 5 6 t(s)

s(t)

20

5

**I**

**II**

a) z prądem,

b) pod prąd.

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**a) b)**

0 1 2 3 4 5 6 t(s)

0 1 2 3 4 5 6 t(s)

**……………….../5 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 4

Dwaj kolarze jechali w wyścigu w etapie indywidualnej jazdy na czas. W pewnej chwili kolarz B był za kolarzem A w odległości 50 m. Od tego momentu obaj kolarze poruszali się ruchem jednostajnym. Po czasie t = 16 min 40 s odległość między nimi była taka sama, ale kolarz B jechał pierwszy. Oblicz różnicę wartości szybkości obu kolarzy.

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**……………….../4 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 5

Oblicz wartość siły, którą można zatrzymać w ciągu 2s ciało o masie 60 kg, poruszające się z szybkością 20m/s.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 6

Pewien samochód jadący z szybkością 50 km/h wpada w poślizg i zatrzymuje się po przebyciu drogi 15 m z zablokowanymi kołami. Oblicz współczynnik tarcia kół samochodu o jezdnię. Przyspieszenie ziemskie g=10 m/s2.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 7

Zaznacz prawidłową odpowiedź. Wykres przedstawia zależność szybkości od czasu dla dwóch ciał K i L o jednakowych masach. Wartość siły wypadkowej działającej na ciało K jest:

1. taka sama jak wartość siły działającej na ciało L
2. trzy razy większa niż wartość siły działającej na ciało L
3. trzy razy mniejsza niż wartość siły działającej na ciało L
4. sześć razy większa niż wartość siły działającej na ciało L

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 8

Silnik motocykla o masie m = 300 kg w czasie jego rozpędzania wykonał pracę 60000 J. Oblicz szybkość uzyskaną przez motocykl.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 9

Na jednym końcu metrowej linijki zawieszono ciężarek o masie 1 kg, a na drugim końcu ciężarek o masie 4 kg. Ustal, w jakiej odległości od lżejszego ciężarka należy podeprzeć linijkę, aby pozostała w równowadze. Masę linijki pomijamy. Przyspieszenie ziemskie g=10 m/s2.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 10

Wykres przedstawia zależność energii kinetycznej od wysokości nad powierzchnią ziemi dla piłki rzuconej pionowo do góry. Przyspieszenie ziemskie g=10 m/s2.

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



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| 1. Piłka porusza się ruchem jednostajnie opóźnionym | P | F |
| 1. Całkowita energia mechaniczna na wysokości 5m wynosi 15 J | P | F |
| 1. Energia potencjalna piłki na wysokości 5m wynosi 15 J | P | F |
| 1. Na wysokości 10 m piłka posiada szybkość równą 0 | P | F |
| 1. Masa piłki wynosi 0,3 kg | P | F |
| 1. Na wysokości 10 m energia potencjalna piłki wynosi 30J | P | F |

**……………….../6 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 11

Kula o masie m = 20 g wystrzelona pionowo w górę z szybkością v0 = 200 m/s, spadła na ziemię z szybkością v = 50 m/s. Oblicz pracę sił tarcia kuli w powietrzu.

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**……………….../4 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 12

Dwie jednakowe kulki z plasteliny o masie m= 0,2 kg każda poruszają się naprzeciw siebie z różnymi szybkościami v1= 2 m/s i v2=3m/s. Kulki zlepiają się w czasie tego niesprężystego zderzenia. Oblicz ilość energii kinetycznej straconej podczas zderzenia kulek.

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**……………….../10 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 13

W czasie wycieczki rowerowej Piotrek pokonał płaski odcinek trasy ze stałą szybkością w czasie 10 minut. Licznik roweru wykazał, że przednie koło wykonało w tym czasie 1500 obrotów. Oblicz szybkość roweru, jeżeli obwód koła wynosi 2m.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 14

Basen ma wymiary: długość 25 m, szerokość 10 m, głębokość 2 m. Zimą wypełniono całkowicie basen śniegiem. Gęstość śniegu wynosi 200 kg/m3. Oblicz masę śniegu i ustal, jaką część basenu zajmie woda powstała z roztopionego śniegu.

Gęstość wody wynosi 1000 kg/m3.

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**……………….../5 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 15

Do wody o masie 2 kg i temperaturze 16 oC wrzucono bryłkę lodu o masie 0,3 kg i temperaturze 0 oC. Temperatura wody po stopieniu lodu wynosiła 4 oC. Oblicz ciepło topnienia lodu. Ciepło właściwe wody wynosi 4200 J/kgK.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 16

Dwie jednakowe metalowe kulki K i L naładowano ładunkiem dodatnim o różnej wartości. Jeżeli połączymy te kulki przewodnikiem, to:



1. prąd nie popłynie
2. elektrony przepłyną od kulki K do kulki L
3. elektrony przepłyną od kulki L do kulki K
4. ładunki dodatnie przepłyną od kulki L do kulki K

**……………….../1 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 17

Opór elektryczny przewodu, przez który w czasie 4 s pod napięciem 12 V przepływa ładunek 3C wynosi:

1. Ω
2. Ω
3. 9 Ω
4. 16 Ω

**……………….../1 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 18

Uczniowie postanowili samodzielnie wykonać grzałkę o mocy 300 W przeznaczoną do pracy pod napięciem 230 V. Do wykonania grzałki użyli przewodnika z chromonikieliny o oporze właściwym ρ = 9,8 . 10-7 Ωm i promieniu 0,25 mm. Oblicz długość tego przewodnika. Wynik podaj z dokładnością do jednego milimetra.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 19

Gdy do końców układu 20 jednakowych oporników połączonych równolegle podłączono napięcie 12 V, to przez oporniki popłynął prąd elektryczny o natężeniu 1,6 A. Oblicz opór elektryczny jednego opornika.

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**……………….../3 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 20

Oblicz czas, w jakim zagotujesz 1 kg wody o temperaturze 20oC w czajniku o mocy 1750W i sprawności η=80%. Ciepło właściwe wody wynosi 4200 J/kgK.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 21

Zaznacz prawidłową odpowiedź. Dociskając strunę gitary do progu zmniejszamy jej długość. Zmniejszenie długości struny powoduje, że:

1. częstotliwość drgań maleje
2. częstotliwość drgań rośnie
3. prędkość rozchodzenia się dźwięku maleje
4. prędkość rozchodzenia się dźwięku rośnie

**……………….../1 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 22

Na skutek zawieszenia ciężarka o masie 2 kg sprężyna rozciągnęła się o 0,06 m. Oblicz energię sprężystości zgromadzoną w sprężynie. Przyspieszenie ziemskie wynosi 10 m/s2.

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**……………….../5 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 23

Na zwierciadło płaskie pada promień świetlny tak, że tworzy ze zwierciadłem kąt 60o. Narysuj rysunek przedstawiający zwierciadło płaskie, promień padający i odbity. Zaznacz kąt padania i kąt odbicia oraz podaj ich miary.

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(Ilość uzyskanych punktów / maksymalna ilość punktów)

# Zadanie nr 24

Narysuj obraz strzałki AB wytworzony za pomocą soczewki.



**……………….../2 pkt.**

(Ilość uzyskanych punktów / maksymalna ilość punktów)

Brudnopis

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