

Indywidualny identyfikator uczestnika konkursu

WOJEWÓDZKI KONKURS PRZEDMIOTOWY   
Z FIZYKI

organizowany przez Łódzkiego Kuratora Oświaty   
dla uczniów szkół podstawowych w roku szkolnym 2023/2024

TEST – ETAP REJONOWY

* Na wypełnienie testu masz **90 min**.
* Arkusz liczy **18 stron** i zawiera **13 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.
* 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.
* W zadaniach przyjmij wartość przyspieszenia ziemskiego 10 .
* Pamiętaj o rachunku (sprawdzaniu) jednostek wielkości fizycznych.

***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

Pocisk opuszcza lufę wiatrówki o długości z prędkością . Zakładając,   
że przyspieszenie pocisku w lufie jest stałe:

1. udowodnij, że przyspieszenie pocisku wynosi .
2. oblicz czas przelotu pocisku przez lufę, jeżeli długość lufy wynosi 1,2 m, a jego prędkość wylotowa wynosi 240 .
3. **Ustawa z dnia 21 maja 1999 r. o broni i amunicji mówi, że każdy kto ukończył   
   18 lat może kupić bez pozwolenia wiatrówkę, której pocisk wylatuje z lufy   
   z energią kinetyczną nie przekraczającą 17 J. W przypadku, gdy uzyskiwana energia jest większa należy wiatrówkę zarejestrować na Policji i strzelać z niej będzie można tylko na strzelnicy.** Renomowani producenci podają wartość prędkości wylotowej dla standardowego śrutu kalibru 4,5 mm o masie 0,5 - 0,6 g. **Sprzedawcy wiatrówek** z reguły nie podają dokładnej energii śrutu tylko prędkość wylotową, bo im wyższa tym klient uważa, że kupuje lepszy sprzęt.   
   Napisz odpowiedź na poniższe pytanie wraz z uzasadnieniem.

Czy sprzedawcy podając, iż kupowana wiatrówka ma prędkość wylotową   
i nie podając przy tym informacji o masie śrutu i konieczności zarejestrowania wiatrówki na Policji wprowadzają klienta w błąd, czy też nie?

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**……………….../ 12 pkt.**

(liczba uzyskanych punktów / maksymalna liczba punktów)

# Zadanie nr 2

Samochód ruszając z miejsca ruchem jednostajnie przyspieszonym przebył   
w czwartej sekundzie ruchu drogę 1,4 m. Oblicz drogę, jaką przebył po trzech pierwszych sekundach ruchu oraz czas, w jakim przebędzie pierwsze 20 m drogi.

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**……………….../ 12 pkt.**

(liczba uzyskanych punktów / maksymalna liczba punktów)

# Zadanie nr 3

Prąd rzeki unosi łódkę o całkowitej masie 105 kg z prędkością 1 względem brzegu. W stronę przeciwną do ruchu łódki wyrzucono z łódki kamień o masie 5 kg   
z prędkością 7 względem brzegu. Oblicz prędkość łódki względem brzegu tuż   
po wyrzuceniu kamienia.

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**……………….../ 4 pkt.**

(liczba uzyskanych punktów / maksymalna liczba punktów)

# Zadanie nr 4

Do aluminiowego garnka o masie 0,5 kg wlano 1 l wody. Temperatura wody i garnka wynosi 20 0C. Oblicz, ile litrów wody o temperaturze 80 0C należy wlać do garnka, aby jego temperatura wraz z wodą wzrosła do 60 0C. Przyjmij, że wymiana ciepła zachodzi tylko między wymienionymi cieczami i aluminiowym garnkiem. Ciepło właściwe wody wynosi 4200 , ciepło właściwe aluminium wynosi 900 , gęstość wody wynosi 1000 .

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**……………….../ 8 pkt.**

(liczba uzyskanych punktów / maksymalna liczba punktów)

# Zadanie nr 5

Prędkość wody w rzece wynosi 3 , a prędkość łodzi względem wody wynosi 4 . Oblicz, z jaką prędkością względem brzegu łódź przepływa rzekę, jeśli odbiła   
od brzegu w kierunku prostopadłym do brzegu. Przedstaw opisaną sytuację   
na rysunku zaznaczając wektor prędkości wody w rzece, wektor prędkości łodzi względem wody i wektor prędkości łodzi względem brzegu.

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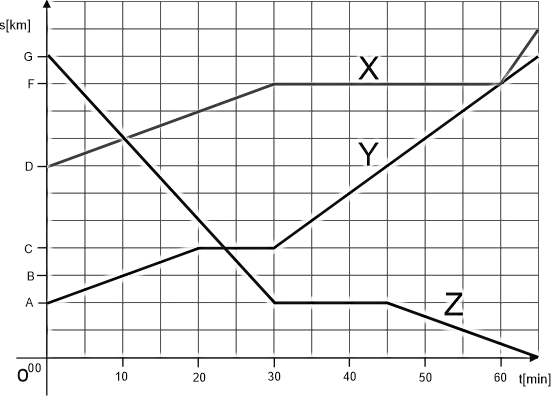
**……………….../ 6 pkt.**

(liczba uzyskanych punktów / maksymalna liczba punktów)

# Zadanie nr 6

Wykres przedstawia fragment kolejowego rozkładu jazdy z zaznaczonymi kierunkami geograficznymi (N, S). Można z niego odczytać, że o godzinie 000 wyjeżdżają równocześnie: ze stacji A pociąg Y, ze stacji D pociąg X i ze stacji G pociąg Z. Przyjmij, że odległość między stacjami A i B wynosi 10 km.

**N**



**S**

Korzystając z informacji przedstawionych na powyższym wykresie wykonaj następujące polecenia. W odpowiedziach podaj odległość w kilometrach, czas w minutach, a prędkość w kilometrach na godzinę.

1. Oblicz szybkość średnią pociągu Y na odcinku między stacjami A i B.

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1. Oblicz szybkość średnią pociągu Y na odcinku CF.

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1. Napisz, na której stacji i po jakim czasie od godziny 000 pociąg X spotka się z pociągiem Y.

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1. Oblicz szybkość średnią pociągu X w czasie 65 minut jego ruchu.

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1. Napisz, na której stacji zatrzymał się pociąg X.

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1. Napisz, jaka jest odległość między stacjami C i F.

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1. Napisz, w którą stronę porusza się pociąg Z w stosunku do ruchu pociągu Y.

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1. Napisz, po jakim czasie od godziny 000 pociąg Z dojedzie do miejscowości A.

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1. Napisz, po jakim czasie od godziny 000 pociąg X spotka się z pociągiem Z.

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1. Napisz, na którą stację wjeżdżają równocześnie dwa pociągi.

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**……………….../ 11 pkt.**

(liczba uzyskanych punktów / maksymalna liczba punktów)

# Zadanie nr 7

Małe wywrotki mają nośność od 3,5 t do 18 t, а pojemność skrzyni jednej wywrotki wynosi 6 m3. Oblicz, ile kursów powinna wykonać wywrotka o nośności 7 t,   
aby przewieźć 70 m3 suchego piasku. Gęstość suchego piasku wynosi 1500 .

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**……………….../ 3 pkt.**

(liczba uzyskanych punktów / maksymalna liczba punktów)

# Zadanie nr 8

R

R

R

Z trzech oporników o oporze R = 6 Ω każdy utworzono

trójkąt (patrz rysunek). Do jednego z oporników

podłączono napięcie o wartości 24 V.

1. Oblicz natężenie prądu, jaki przepłynie przez ten opornik.

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1. Oblicz natężenie prądu, jaki przepłynie przez pozostałe dwa oporniki.

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1. Oblicz natężenie prądu, jaki przepłynie przez źródło napięcia.

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1. Oblicz opór opornika, którym można zastąpić przedstawiony na rysunku układ oporników w opisanej sytuacji.

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**……………….../ 7 pkt.**

(liczba uzyskanych punktów / maksymalna liczba punktów)

# Zadanie nr 9

W samochodzie podłączony jest akumulator o napięciu 12 V i pojemności 60 Ah. Oblicz, jak długo będzie pracował ten akumulator, jeśli kierowca na postoju zapomni wyłączyć przednie światła przez, które płynie prąd o natężeniu 2 A. Czas podaj w godzinach.

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**……………….../ 6 pkt.**

(liczba uzyskanych punktów / maksymalna liczba punktów)

# Zadanie nr 10

Oblicz pracę, jaką należy wykonać, aby ciało

20 %

o ciężarze 200 N wsunąć ruchem jednostajnym, bez oporów ruchu, po równi pochyłej o długości   
6 m i nachyleniu 20 % (patrz rysunek).

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**.……………….../ 6 pkt.**

(liczba uzyskanych punktów / maksymalna liczba punktów)

# Zadanie nr 11

Jakub postanowił wybrać się z Łodzi do Gdańska autostopem. Pierwszą część trasy równą całkowitej drogi z Łodzi do Gdańska przebył pieszo z szybkością średnią   
, następnie całkowitej drogi przejechał samochodem osobowym z szybkością średnią , a resztę drogi przejechał samochodem ciężarowym   
z szybkością średnią . Oblicz, ile czasu trwała cała podróż autostopowicza oraz oblicz szybkość średnią, z jaką on podróżował na całej trasie Łódź - Gdańsk. Przyjmij, że odległość z Łodzi do Gdańska wynosi 340 km.

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**……………….../ 10 pkt.**

(liczba uzyskanych punktów / maksymalna liczba punktów)

# Zadanie nr 12

Zadaniem grzałki elektrycznej do bojlera jest generowanie ciepła, które ogrzeje wodę znajdującą się w bojlerze. Zakładając, iż woda w bojlerze zajmuje objętość 120 l oraz, że bojler ma ustawioną na termostacie temperaturę 60 0C (temperaturę maksymalną, do której ma podgrzewać wodę) oblicz, jakie będą koszty   
(w złotych, po zaokrągleniu do dwóch miejsc po przecinku) ogrzania wody w tym bojlerze przy zamontowaniu w nim grzałki o mocy 1,5 kW, a jakie przy grzałce o mocy 3 kW. Napisz, którą z grzałek lepiej zamontować i wyjaśnij dlaczego. Przyjmij,   
że temperatura zimnej wody wynosi 20 0C oraz, że całe ciepło generowane przez grzałkę jest przekazywane wodzie. Ciepło właściwe wody wynosi , gęstość wody wynosi , a cena 1 kWh wynosi 0,90 zł.

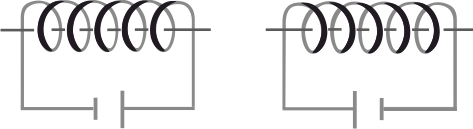
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**……………….../ 12 pkt.**

(liczba uzyskanych punktów / maksymalna liczba punktów)

# Zadanie nr 13

Napisz, czy zwojnice przedstawione na poniższych rysunkach przyciągają się czy odpychają. Odpowiedź uzasadnij, zaznaczając na rysunkach kierunki przepływu prądu elektrycznego na zwojnicy oraz bieguny magnetyczne na końcach każdej   
ze zwojnic.



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**……………….../ 3 pkt.**

(liczba uzyskanych punktów / maksymalna liczba punktów)

**Brudnopis**

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